TTI 1110A
with
1111A LINE SWITCH

CALIBRATION PROCEDURE

TELECOMMUNICATIONS TECHNOLOGY, INC.
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TTI 1110A
TRANSMISSION/NOISE
TEST SET
with
1111A LINE SWITCH

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Figure 1-0. TTI 1110A Transmission/Noise Test Set with TTI 1111A Line Switch.

TTI 1110A TRANSMISSION/NOISE TEST SET with TTI 1111A LINE SWITCH CALIBRATION PROCEDURE

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LIST OF FOLD-OUTS

(Section 6 Only)

FOLD-OUT NO.	DESCRIPTION
1a	*A.C. POWER SUPPLY BOARD*
1b	*A.C. POWER SUPPLY BOARD*
1c	*D.C. POWER SUPPLY BOARD*
2a	*ASSEMBLY A.C. POWER SUPPLY*
2b	*A.C. POWER SUPPLY*
2c	*ASSEMBLY D.C. POWER SUPPLY*
3	*AUTO RANGE LOGIC BOARD*
4	*DIGITAL BOARD*
5	*LEVEL ANALOG BOARD*
6	*FILTER BOARD*
7	*OSCILLATOR BOARD*
8	*FREQUENCY COUNTER BOARD*
9	*DISPLAY BOARD*
10	*FINAL ASSEMBLY TRANSMISSION/NOISE TEST SET*
11	*1111A LINE SWITCH AMPLIFIER BOARD*
12	*INTERCONNECT DIAGRAM TRANSMISSION/NOISE TEST SET*
13	*INTERCONNECT DIAGRAM 1111A LINE SWITCH*

TTI 1110A TRANSMISSION/NOISE TEST SET
with TTI 1111A LINE SWITCH
CALIBRATION PROCEDURE

1. GENERAL

1.01 This section contains all checks necessary to verify the performance of the 1110A Transmission/Noise Test Set, and the optional 1111A Line Switch. A complete calibration can be given by performing the tests in Parts 4 and 5 in the order shown. If the adjustments do not restore the levels to the values shown, or if checks of a parameter without an adjustment shows it to be outside the limits allowed, the equipment should be returned for repair.

1.02 Instructions to disassemble the test set for repair, and to reassemble it after the tests have been completed are given in Part 3.

CAUTION

Follow the steps in each procedure carefully, and do not make any adjustment not given in this manual. Failure to do this may result in disturbing a factory-set adjustment.

1.03 After adjustments have been made ensure that all adjustable components such as potentiometers and trimmers are secure by applying an adhesive compound such as Glyptol. This will prevent changes in the adjustment due to vibration or shock.

1.04 It is recommended that routine (scheduled) calibration of the 1110A Transmission/Noise Test Set (and 1111A Line Switch if installed) be performed annually. Otherwise, calibration is only required when corrective maintenance has upset or altered pre-set adjustments.

FACTORY MAINTENANCE AND REPAIR

1.05 During the warranty period, all troubleshooting and repair of equipment, other than the calibration procedures given in this manual, must be performed by TTI or an authorized representative. Any attempt to repair or modify the Test Set, without authorization from TTI, voids the equipment warranty.

1.06 If a malfunction cannot be resolved through the use of this manual, call TTI Customer Service at (408) 735-8080. A telephone consultation can sometimes resolve an apparent problem without the need to make repairs to the Test Set.

1.07 Should the telephone consultation indicate a need for repair, TTI will authorize the return of the affected circuit board(s), parts, or the entire instrument. In any case, the defective parts MUST be CAREFULLY packaged for return to TTI and should be shipped prepaid. Address package to:

Telecommunications Technology, Inc.
555 Del Rey Avenue
Sunnyvale, California 94086
Attention: Customer Service Department

REPAIR CHARGES

1.08 While the Test Set is under warranty and the necessary repairs are covered by the warranty statement located on the inside rear cover of this manual, the customer's only responsibility is to pay the shipping costs to return the affected parts to TTI. TTI will make repairs at no charge and will pay one-way return shipping charges.

1.09 Should the equipment not be on warranty, or if the necessary repairs are not covered by the warranty, TTI will make a reasonable charge for the repair and will bill the customer for return shipping charges.

MAINTENANCE GUIDELINES

1.10 Before performing maintenance of any kind, approach the malfunction with an overall visual look of the Test Set's operation. Look for the following indications:

a. Common indications
b. Fault patterns

NOTE

An investigation should always be made to ensure that the trouble is not being caused by external factors such as high temperature, radiated fields, moisture, etc. There are a number of malfunctions that can be directly related to the effects of external equipment on digital circuitry. Take time and be certain before proceeding with the repair information in this section. It may save repair time.

2. PRELIMINARY CHECKS

2.01 Preliminary checks should always be made when problems develop under normal equipment operation, or during routine maintenance. Some of the following checks require that the Test Set be partially disassembled. Therefore, use the disassembly/reassembly procedures in this section.

WARNING

Turn the 1110A power switch OFF and remove the power cord from 115 Vac receptacle before removing or replacing any circuit boards, the line fuse, or before checking internal wiring. Both 115 Vac and 170 Vdc exist inside the Test Set, in particular, at the power supply and on the digital circuit board.

a. Check all switch positions for proper settings. This includes the 115/230 and the EXTERNAL/INTERNAL switches located on the rear panel.

b. Ensure that the Test Set is receiving single-phase line voltage with proper grounding.

c. Check line fuse on the rear panel.

d. Ensure that the Test Set is receiving the correct signal input.

e. Ensure that all external ground paths are properly connected and that no ground loops exist.

3. DISASSEMBLY/REASSEMBLY

3.01 The disassembly procedure and reassembly procedure that follows must be used in conjunction with Figures 3-1 and 3-2. Disassembly and reassembly of the Test Set must be performed in the sequence given.

CAUTION

When unsoldering or disconnecting wire leads, ensure that the leads are properly marked or coded for proper reassembly.

WARNING

Hazardous voltages appear within the instrument even with the POWER switch off.

3.02 These procedures are given for the combined 1110A and 1111A Test Sets. If a 1110A only model is to be calibrated, ignore instructions for the 1111A Line Switch.

3.03 Do not separate the 1111A from the 1110A Transmission/Noise Test Set.

DISASSEMBLY PROCEDURES

3.04 To disassemble the Test Set follow Figures and proceed as follows: (Figure 3-1.)

a. Remove rear bezel(s) 1(a) and 1(b) by removing four screws (2).

b. Slide out top, bottom and side panels 3(a) through (f).

c. Replace bezel(s) with screws (2) to prevent damage to rear panel during calibration.

d. (Figure 3-2.) Remove Frequency Counter Section by first removing 3 screws (4).

e. Unplug flexible cable using needle-nosed pliers as illustrated (Figure 3-2c.).

f. Slide Frequency Counter Unit out sufficiently to expose wiring (Figure 3-2d.).

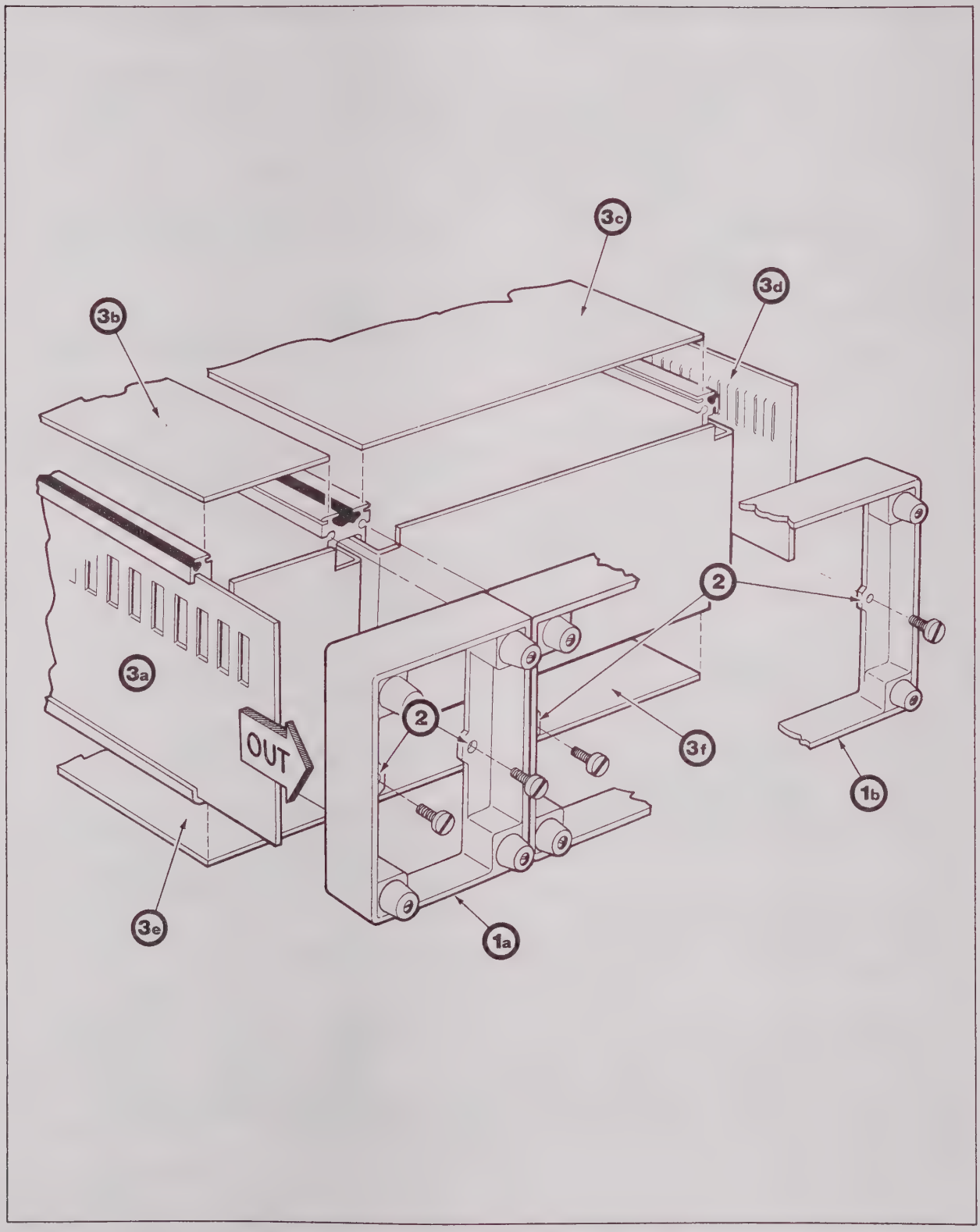


Figure 3-1. Removing the Panels from a Test Set

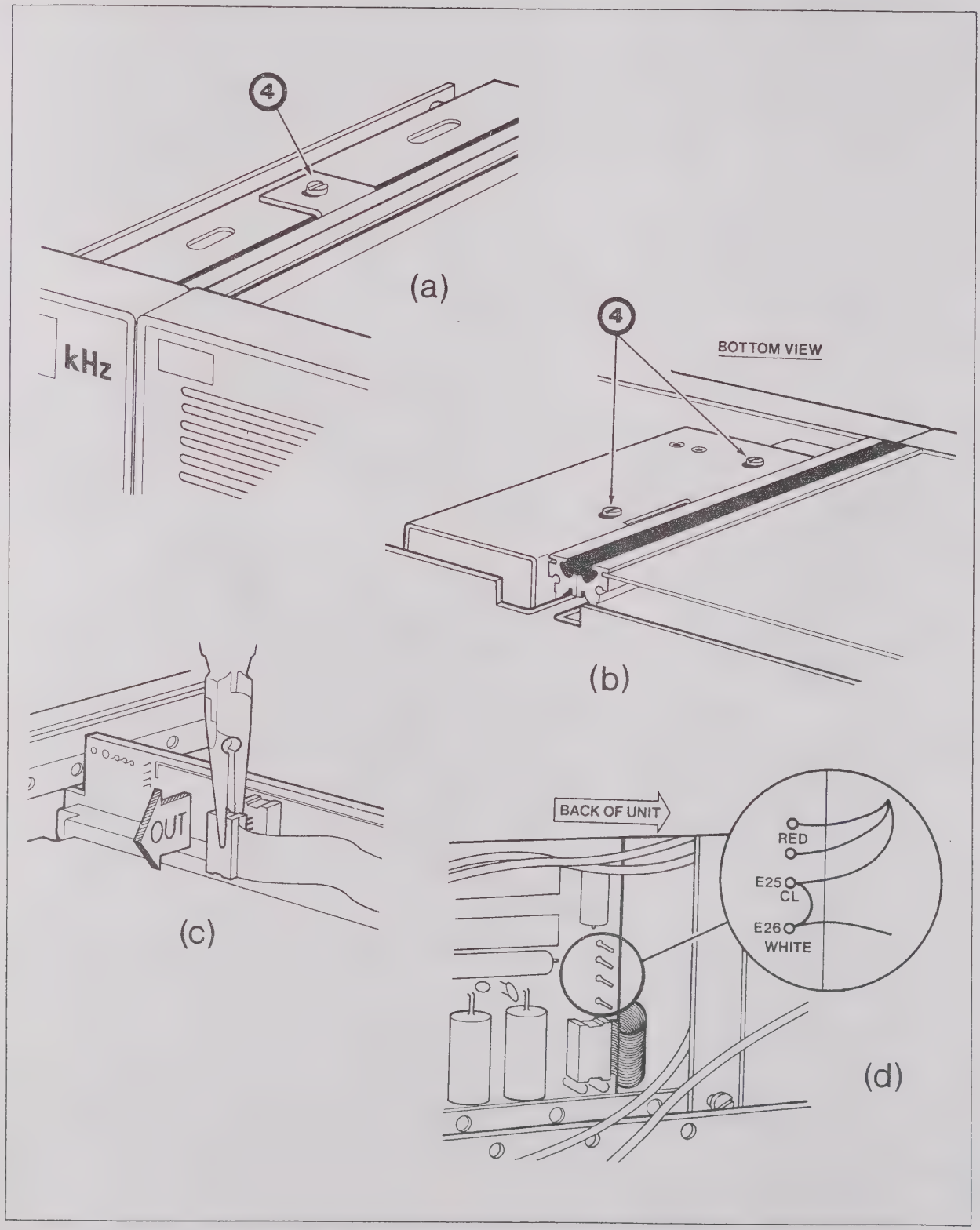


Figure 3-2. Removing Frequency Counter Section.

g. Using pliers, remove the four quick disconnects shown.

h. Replace the flexible cable connector, removed in (e) above, and jumper E25 and 26 as shown. Take care not to bend the pins.

NOTE

The four wires disconnected in (g) do not have to be replaced for the calibration procedure.

The Test Set is now exposed sufficiently for the calibration procedures to be executed.

REASSEMBLY PROCEDURES

3.05 To reassemble the Test Set, study Figures 3-1 and 3-2, and proceed as follows:

a. Unplug the Frequency Counter flexible cable (Figure 3-2c.).

b. Remove the jumper from E25 and 26 on the oscillator board.

c. Insert the Frequency Counter into its place in the Test Set, and slide in until it is about two inches from its fully inserted position.

d. Plug in the Frequency Counter flexible cable connector (Figure 3-2c.).

e. Re-install the four wires on the terminals (Figure 3-2a.).

f. Fully insert the Frequency Counter, ensuring that the front panel is positioned correctly.

g. Replace three screws (Figures 3-2a. and 3-2b.).

h. Remove the rear bezel(s) (Figure 3-1, 3-1a. and 3-1b.).

j. Slide panels into place, ensuring that the rubber feet are positioned correctly on the bottom panel.

k. Replace bezel(s) and tighten screws (2) securely.

The Test Set is now ready for service.

4. CALIBRATING THE 1110A TEST SET

4.01 Before performing these tests, remove th side panels and Frequency Counter chass as described in Part 3 of this section. Replace th rear panel bezels to prevent damage to the un during calibration.

CAUTION

All tests are conducted with power ON. Power should be switched off when connecting or disconnecting test equipment. Unplug power cord when removing panels and disassembling the Test Set.

TEST EQUIPMENT REQUIRED

4.02 The calibration tests are written for the test equipment listed in Table 4-1 below. Any other equipment used should meet or exceed the specification of the items listed.

4.03 The HP745A recommended is the most critical of the test equipment used. This generates a signal at a variable frequency and voltage level, and includes offset errors. This offset error is given as a percentage and is calibrated in this way on the error measurement scale. If the error measurement is set to 0, then this measurement is not used. Offset errors from the original value are also given in dB for use when the 745A calibrator is not available and measurements are available in dB. A measuring device should be capable of discriminating errors to ±.005 dB.

4.04 The 1110A Frequency Counter is used as a measuring device in this test. The Counter is operative only when the SEND/RCV switch is in the RCV position. An external frequency counter may be used.

Table 4-1. Recommended Test Equipment

Oscilloscope	Tektronix	453
Digital Voltmeter	Dana	4700
AC Calibrator	Hewlett-Packard	745A

CALIBRATING THE POWER SUPPLY LEVELS

WARNING

The following areas are still live when the POWER switch is OFF. Fuse; 115/230V switch; trace on upper side of power board.

4.05 There are three types of power supply boards as follows.

a. AC Power Supply Board P1110-016-02, Test 4.06 (Foldout 1a)
b. AC Power Supply Board P1110-016-01, Test 4.07 (Foldout 1b)
c. DC Power Supply Board P1103-048-04, Test 4.08 (Foldout 1c)

The (a) type is the most recent version and contains only one level adjustment. Type (b) is an early version replaced by (a). Type (c) is for the DC version and includes a battery pack for the power supply. Select the test that applies to the 1110A being tested and ignore the other two tests.

4.06 AC Power Supply Board P1110-016-02 (Foldout 1a).

a. Check the following test points for these voltages.

TP5	−10.000V±0.001V	Adjust R5 to correct level
TP6	+10.000V±0.020V	No adjustment
TP3	−15.000V±0.1V	"
TP4	+ 5.000V±0.025V	"
TP2	Ground	"
TP1	+15.000V±0.1V	"

Check the 200V Power Supply Level.

b. Turn Power switch OFF.
c. Connect high lead of DVM to C10.
d. Switch Power ON.
e. Voltage should read 200V±10V.

4.07 AC Power Supply Board P1103-016-01 (Foldout 1b) is to be adjusted and checked as follows:

a. Adjusting the +14V Supply.

1. Connect the DVM between TP1 (high) and GND (low).
2. Voltage should read 14.000V±0.1V.
3. Adjust R4 to bring indicated level within limits.

b. Adjusting the −14V Supply.

1. Connect the DVM between TP3 (high) and GND (low).
2. Voltage should read −14.000V±0.1V.
3. Adjust R10 to bring indicated voltage within limits.

c. Adjusting the −10V Supply.

1. Connect the DVM between TP5 (high) and GND (low).

CAUTION

Do not short TP5 or component damage will result.

2. Voltage should read −10.000V±0.001V.
3. Adjust R23 to bring indicated voltage within limits.

d. Checking the +10 Volt Supply.

1. Connect the DVM between TP6 (high) and GND (low).
2. Voltage should read +10.000V±0.02V. There is no adjustment for this voltage level.

e. Checking the +5 Volt Supply.

1. Connect the DVM between TP4 (high) and GND (low).
2. Voltage should read +5.000V±0.25V. There is no adjustment for this voltage level.

f. Checking the 200 Volt Supply.

1. Turn POWER switch OFF.
2. Connect high lead to C8 as shown in Foldout 1b.

3. Ground low lead.
4. Switch POWER ON.
5. Voltage should read 200V±10V.

4.08 The DC Power Supply Board P1103-048-04 (Foldout 1c). Connect the external power supplies as shown in Figure 4-1. +14V dc is obtained across the +9V and +5V supplies. Test equipment required is shown in Table 4-2.

Table 4-2. Test Equipment Required

1-Power supply; 1-Power supply; 1-Power supply; 1-Current probe*; 1-Variac 1-Oscilloscope 1-DVM	0—6V dc 0—10V dc 0—15V dc 0—500 mA 0—130V ac	800 mA 500 mA 500 mA

*If a current probe is not available, the circuit wiring must be interrupted.

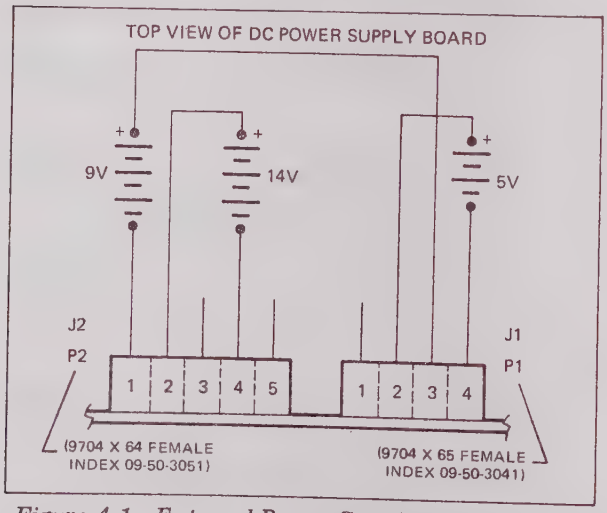


Figure 4-1. External Power Supply Connections.

NOTE

1. Power supplies to have floating ground.
2. Measure voltages of external power supplies across their terminals.

4.09 The following procedure is to be used when calibrating the dc power supply from an external source:

a. Set the POWER switch in the off (in) position.

b. Connect the external power supplies with a cable shown in Figure 4-1.

c. Turn the POWER switch on (out).

d. Check these voltages on the DC Power Supply Board (Foldout 1c).
−10.000V±0.001V dc at TP −10V. Adjust R29 if required.
+10.000V±0.020V dc at TP +10V. No adjustment.

e. Set the external power supply levels as follows and check that the voltages in (d) remain within those limits.
Set +14V to +12.5V (by adjusting +9V supply)
Set −14V to −12.6V

f. If (e) is successful, reset the power supply voltages to their original levels.

g. Set the +5V external power supply to 5.00V. Check test point HV, which should be 200V±10V. (Foldout 1c).

h. Increase the external power supply to 5.4V. The 200V level should increase to 215V±5V.

j. Reduce the external power supply to 4.5V. The high voltage should now read between 175 and 190V dc.

k. Restore +5V power supply voltage to 5.00V. Check that all voltages across the terminals of the external supplies are still within the limits specified in (b).

l. Set a scope to DC coupling, and place the probe on the C/O test point of the board. A logic high should be observed on the scope.

m. Slowly reduce the +5V external power supply. Between 4.3 and 4.5 volts, the signal goes to logic low.

n. If (m) is successful, restore the power supply level to 5V.

p. Switch the POWER switch off, then on and wait 30 seconds.

q. Slowly reduce the +9V power supply level. Between 7.55 and 7.25 V the logic level goes low.

r. If this test is successful, reset the +9V supply.

s. Switch the POWER switch off, then on and wait 30 seconds.

t. Slowly reduce the —14V power supply level. Between 12.8 and 12.6V the logic level goes low.

u. Turn the 1110A off, and disconnect the external power supplies.

v. Connect the batteries to P1 and P2.

w. Plug the ac power cord into a variac. Turn the variac on and increase the voltage to 115V ac. Current drawn should be approximately 100 mA.

x. Check for ripple at the emitters of Q3, Q8, and Q13. The ripple should be approximately 1V p-p, sawtooth at 120 Hz.

y. Connect a dc current probe around the connection from P2 pin 4 (—14V). Adjust R2 for a current reading of 100-120 mA.

z. Connect a dc current probe around the connection from P1 pin 3 (+14V). Adjust R4 for a current reading of 100 to 120 mA.

aa. Connect a dc current probe around the connection from P1 pin 2 (+5V). Adjust R3 for a current reading of 300 to 360 mA.

ab. Turn the 1110A on, and repeat steps (y), (z) and (aa). No significant change should be seen in the +14V and —14V currents. A nominal ±30 mA change may be observed in the +5V charging current.

ac. Vary the input voltage between 105V and 126V ac. Change in the currents in (ab) above should be less than ±5 mA.

ad. Turn the 1110A and variac off. Check with the current probe. No leakage current should flow in the +5V, +14V and —14V points given in steps (y), (z), and (aa).

ae. Charge the 1110A for 14 hours. Check that the test set runs for a minimum of 3 hours.

af. Check the battery compartments and batteries for signs of leakage. Clean with a mild solution of citric acid if necessary.

TEST EQUIPMENT SET UP

4.10 The test equipment should be set up as shown in Figure 4-2(a) to check an 1110A Transmission/Noise Test Set, or as in 4-2(b) when the 1111A Line Switch is installed. Note that when the 1111A is installed all inputs and outputs to the test set are made through the 1111A Line Switch; inputs and outputs directly to the 1110A are blocked. In the tests only the 1110A test set is shown. Unless otherwise specified, settings for the 1111A Line Switch are as shown in Figure 4-2(b) for all tests. Cables required are as follows.

a.	Calibrator Output Double Banana with ground	to	1110A Input. 310-type jack
b.	1110A Output 310-type jack	to	1110A Input. 310-type jack
c.	Calibrator Output Double Banana jack	to	1111A Input. 310-type jack
d.	1111A Output 310-type jack	to	1111A Input. 310-type jack

NOTE

Switches shown in the diagrams are shaded (depressed) or not shaded (out), EXCEPT the power switch which is shown shaded (ON, out) or not shaded (OFF, in).

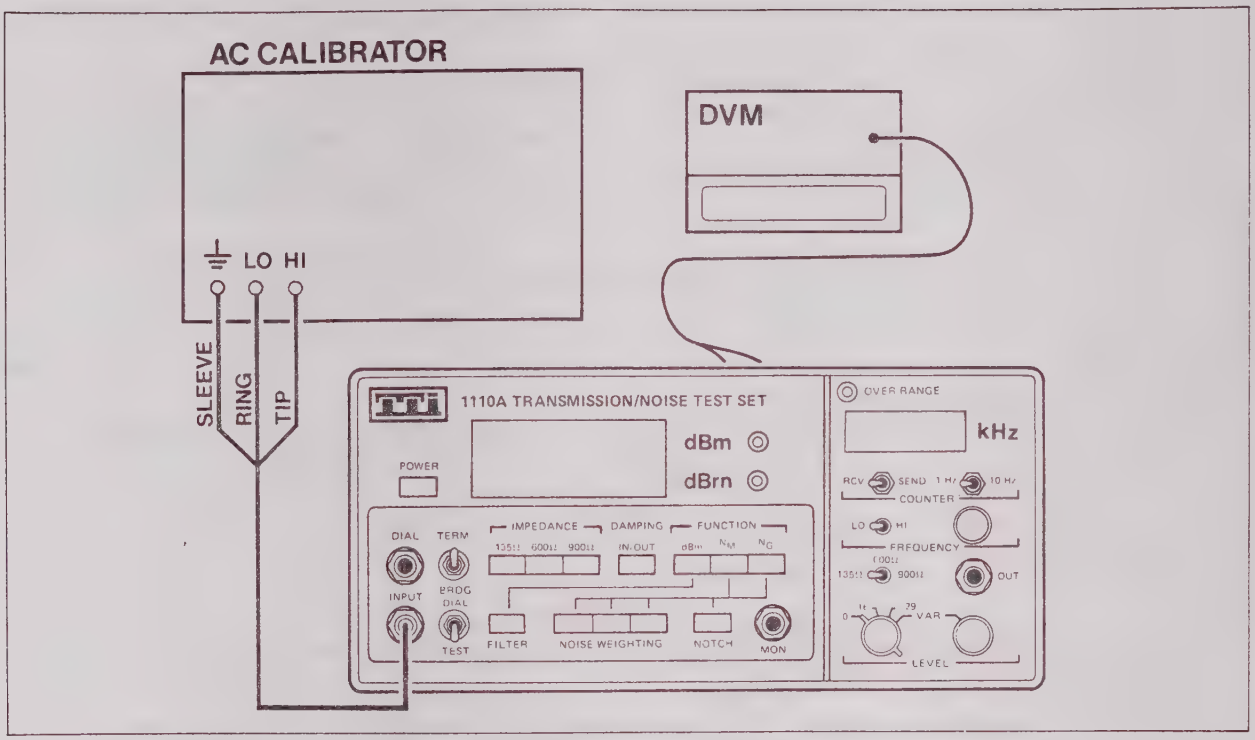


Figure 4-2a. Test Equipment Connections.

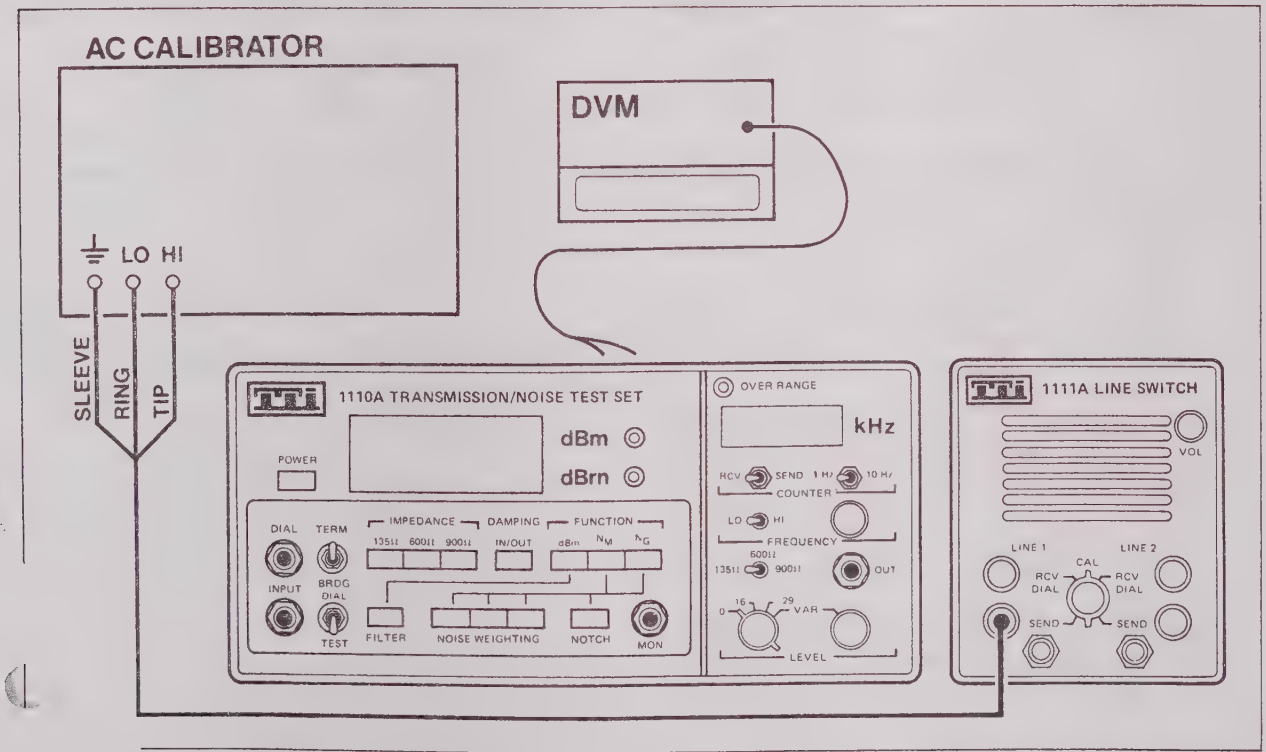


Figure 4-2b. Test Equipment Connections.

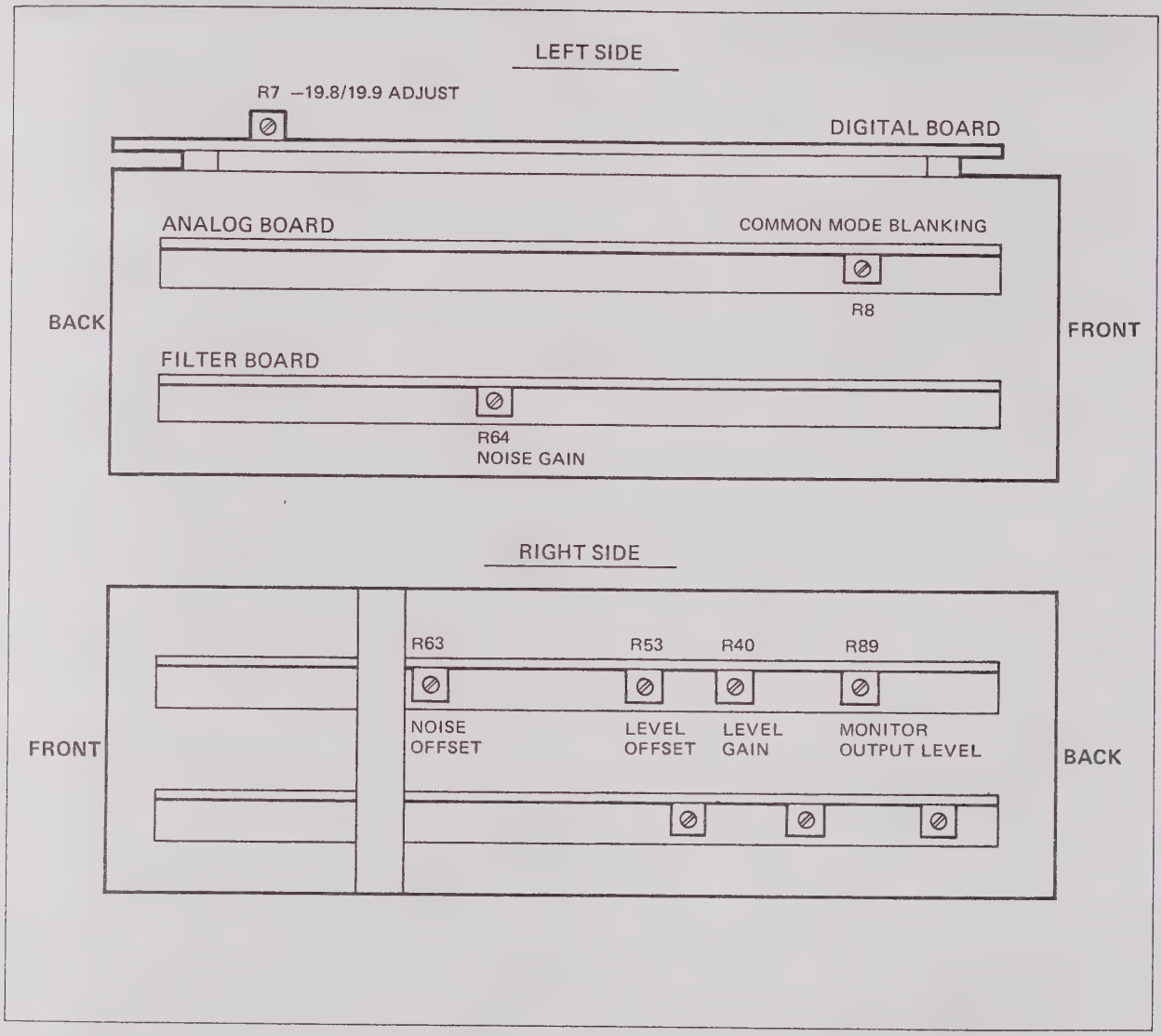
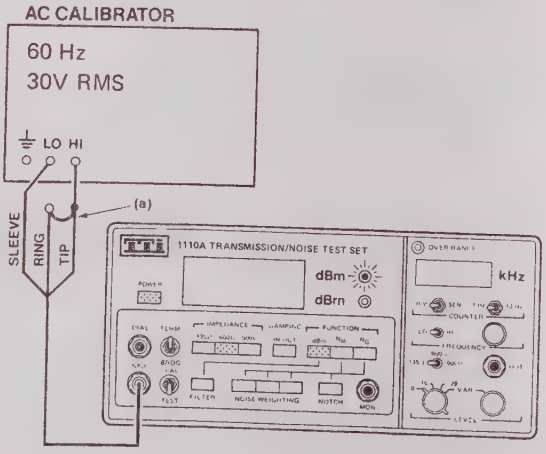


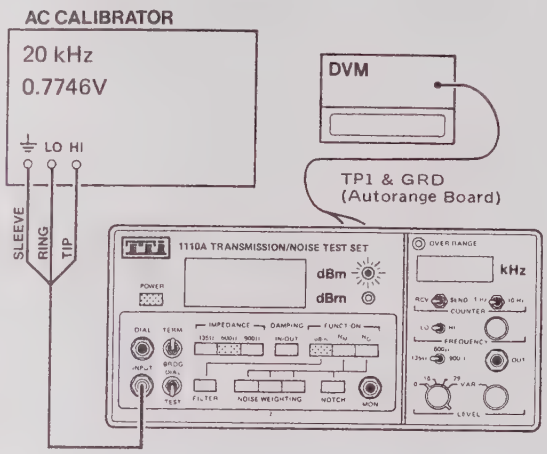
Figure 4-3. Noise Window Adjustment.

PERFORMANCE CHECKS AND ADJUSTMENTS

4.10 The following procedures are for conducting 1110A performance checks and adjustments. The equipment set-up and procedure for each check or adjustment is given in the left and right columns respectively. All checks and adjustments and their respective steps must be performed in the sequence given.

EQUIPMENT SET-UP	PROCEDURE
	ADJUSTING THE 1 MHz CLOCK a. Using a 10X probe, connect the frequency counter to TP1 and ground on the Digital Board. Check that the frequency is 1 MHz ±10 Hz. If the clock frequency requires adjustment follow the procedure below. b. Remove the two screws securing the Autorange board (Foldout #3). c. Adjust C6 on the Digital board (Foldout #4) until the frequency is within the limit specified. d. Replace the Autorange board.
	*COMMON MODE ADJUSTMENT* a. Short tip to ring and connect them to the HI output of the ac calibrator. Connect the sleeve to the LO side of the calibrator output. b. Set the ac calibrator: Frequency 60 Hz Voltage 30V, no offset error c. Digital display on the 1110A should be blank. If not, adjust R8 (foldout #5, Level Analog Board) until the display goes out of its range at −49.9 dBm. d. Set voltage level to less than 10V. e. Remove the short (step a), and connect tip to HI; ring to LO; sleeve to ground.

EQUIPMENT SET-UP



PROCEDURE

LEVEL WINDOW CHECK

a. Set the ac calibrator: Frequency 20 kHz
Output 0.7746V, no offset error

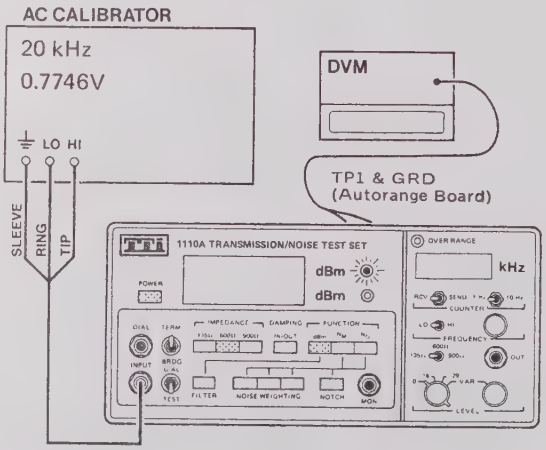
b. 1110A reads —19.9K —20 dBm.

c. Check IC15 pin 6 on Autorange Board foldout #3. The level should be 3.162±0.006V. Return unit for repair if the reading is outside this limit.

d. Set error measurement to +0.15% (—0.015 dB). 1110A display should read —20 dBm.

e. Set error measurement to —0.15% (+0.015 dB). 1110A display should read 19.9 dBm.

If these readings are obtained, go to next page and continue checks and adjustments. If not, calibrate following Level Window Calibration procedure below.



LEVEL WINDOW CALIBRATION

a. With ac calibrator set as in Level Window Check above, set error measurement to +0.15% (—0.015 dB).

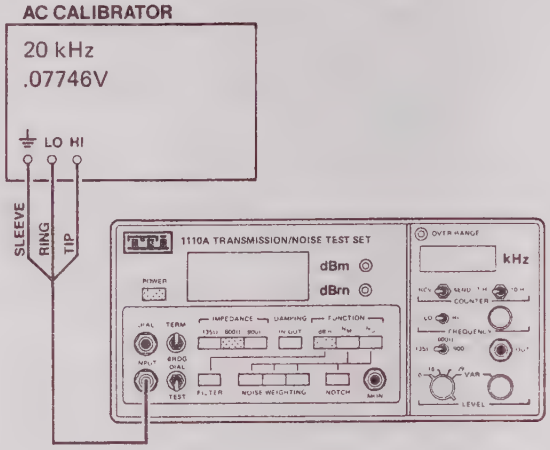
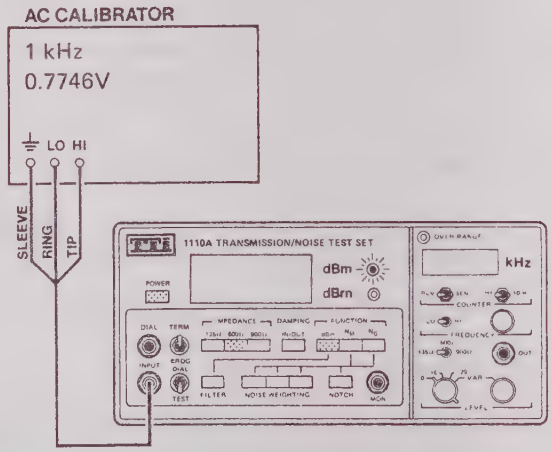
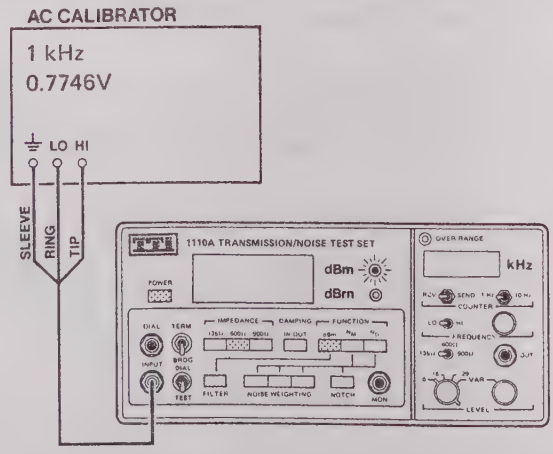
b. Turn level gain R40 two turns CW (foldout #5).

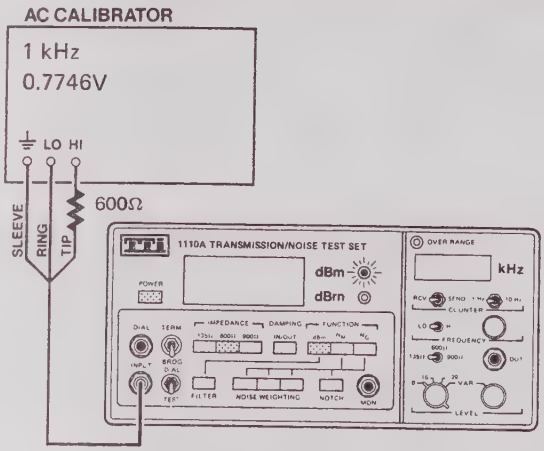
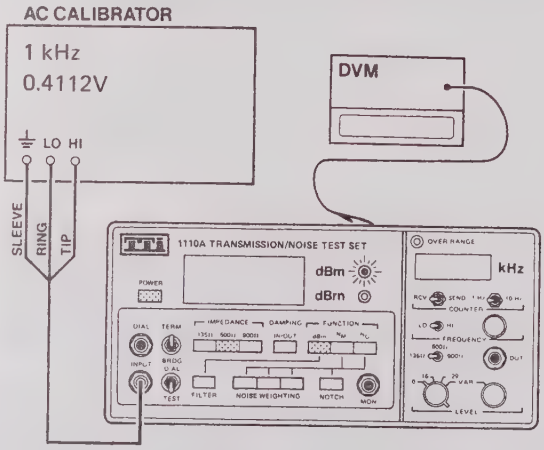
c. Turn level offset R53 slowly CCW (foldout #5) until the voltage on the DVM steps from 9 volts to approximately 3 volts. Then turn R53 CW until the voltage steps back to 9V.

d. Set offset error to —0.15% (+0.015 dB). Adjust R40 slowly to switch window from 10.000V (approximate) to 3.162V (approximate).

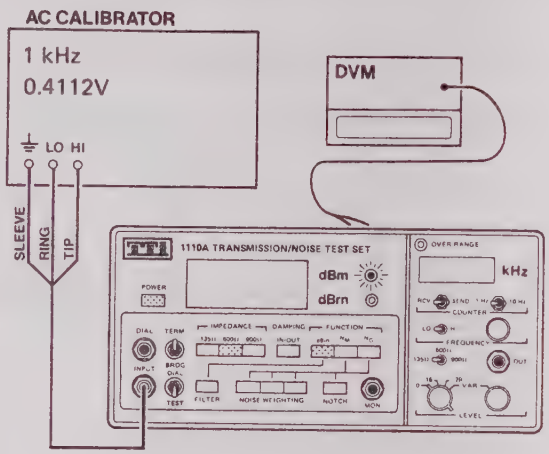
e. Set offset error to +0.15% (—0.015 dB). Adjust slowly R53 to switch window from 3.162V (approximate) to 10.0V (approximate).

f. Repeat steps (c) and (d) until the window changes from 10.0V to 3.162V (approximate) between error measurements +0.10% and +0.15% (—0.010 and —0.015 dB), and from 3.162 to 9.970 (approximate) between —0.10% and —0.15% (+0.010 and +0.015 dB).

EQUIPMENT SET-UP	PROCEDURE
	*SETTING THE LOGARITHMIC CONVERTER* a. Set the ac calibrator: Frequency 20 kHz Output 0.07746V Offset Error −1.1% (+0.11 dB) b. The 1110A display should flicker between −19.8 and −19.9 dBm. If not, adjust R7 (foldout #4) until this is displayed. c. Adjust the offset error towards +1.0% (−0.10 dB), until the 1110A display reads −20.1 dB. Offset error must be in the range of +1% ± 0.4% (−0.10 ± 0.04 dB).
	*LEVEL AUTORANGE CHECK* a. Set the ac calibrator: Frequency 1 kHz Output 0.7746V, no offset error Voltage Range 1V b. 1110A displays 0.0 dBm. c. Set calibrator output voltage to 0.07746; 1110A reads 20.00 dBm. d. Set calibrator output voltage to 0.007746; 1110A reads 40.00 dBm. e. Set calibrator output voltage to 7.746V; 1110A display blank (overrange). f. Set calibrator output voltage to 0.0007746; 1110A display goes blank (underrange).
	*IMPEDANCE CHECK* a. Set ac calibrator: Frequency 1 kHz Output 0.7746V, no offset error b. Set BRDG/TERM switch to BRDG. 1110A displays 0.0 dBm. c. Press IMPEDANCE buttons and check 1110A display: 135 Ohm +6.4 dBm 600 Ohm 0.0 dBm 900 Ohm −1.7 dBm

EQUIPMENT SET-UP	PROCEDURE
	*BRIDGING/TERMINATING CHECK* a. Connect a 600Ω resistor in series with the Hi output. b. Set ac calibrator: Frequency 1 kHz Output 0.7746V, no offset error c. Set BRDG/TERM switch to BRDG. 1110A displays 0.0 dBm. d. Set BRDG/TERM switch to TERM. 1110A displays −6.0 dBm.
	*CHECKING THE FREQUENCY RESPONSE* a. Set the ac calibrator: Frequency 1 kHz Output 0.4112V, no offset error b. Set the 1110A to TERM, 600 ohms. c. Connect the DVM to TP1 on Autorange Board (foldout #3). Note the reading. d. 1110A should display −5.5 ±0.1 dB. e. Set ac calibrator to 50 Hz. f. Adjust offset error to reset DVM to voltage noted in (c). The offset error should be less than ±1% (±0.1 dB) or return unit for repair. g. Set ac calibrator to 20 kHz. h. Adjust offset error to reset DVM to voltage noted in (c). Offset error should be less than ±0.4% (±0.04 dB) or return unit for repair. j. Set ac calibrator to 40 kHz. k. Adjust offset error to reset DVM to voltage noted in (c). Offset error should be less than ±1% (±0.1 dB) or return unit for repair. l. Set ac calibrator to 60 kHz. (Continued)

EQUIPMENT SET-UP



PROCEDURE

CHECKING THE FREQUENCY RESPONSE (Continued)

m. Adjust offset error to reset DVM to voltage noted in (c). Offset error should be less than ±1% (±0.1 dB) or return unit for repair.

n. Reset ac calibrator: Frequency 1 kHz
Output 0.013004V, no offset error

p. DVM should read 5.310V±0.03V. Record the voltage.

q. 1110A should read −35.5 dBm.

r. Set ac calibrator to 50 Hz.

s. Adjust offset error to reset DVM to voltage noted in (p). Offset error should be less than (±0.1 dB) or return unit for repair.

t. Set calibrator to 20 kHz.

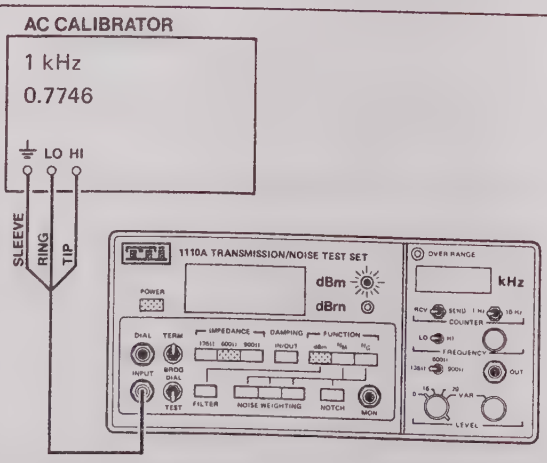
u. Adjust offset error to reset DVM to voltage noted in (p). Offset error should be less than ±1% (±0.1 dB) or return unit for repair.

v. Set calibrator to 40 kHz.

w. Adjust offset error to reset DVM to voltage noted in (p). Offset error should be less than ±1% (±0.1 dB) or return unit for repair.

x. Set ac calibrator to 60 kHz.

y. Adjust offset error to reset DVM to voltage noted in (p). Offset error should be less than ±1% (±0.1 dB) or return unit for repair.



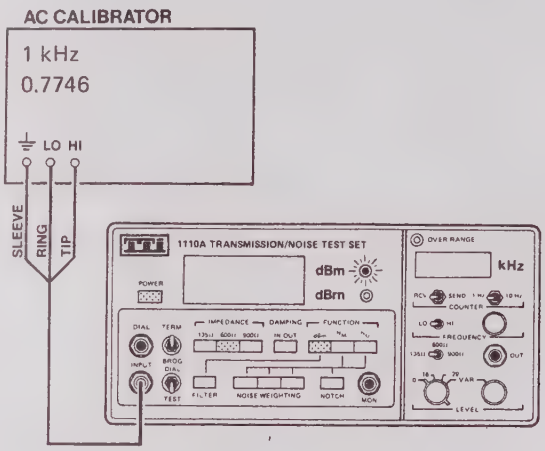
TRANSIENT CHECK

a. Set ac calibrator: Frequency 1 kHz
Output 0.7746V, no offset error

b. 1110A should read 0.0 dBm.

c. Range up and down in 10 or 20 dB steps in quick succession. Watch for clean range changes on the 1110A display.

EQUIPMENT SET-UP	PROCEDURE



BANDPASS FILTER CHECK

a. Set ac calibrator: Frequency 1 kHz
Voltage 0.7746V, no offset error

b. 1110A displays 0.0 dBm.

c. Press Filter BP switch. 1110A display must not change by more than ±0.1 dBm.

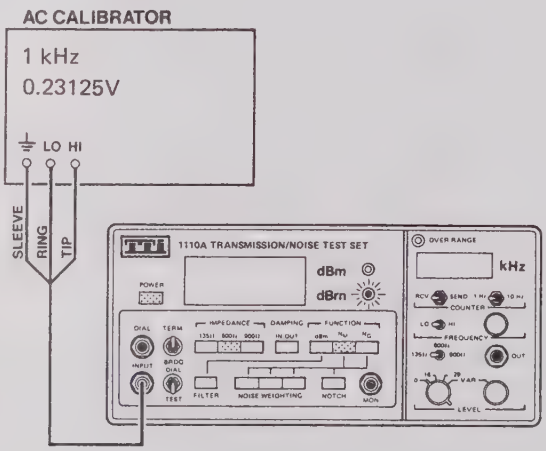
d. Set ac calibrator to 60 Hz.

e. 1110A should read less than —25 dBm.

f. Set ac calibrator to 60 kHz.

g. 1110A should read less than —30 dBm.

h. Sweep the ac calibrator through Frequency Range from 400 Hz to 4 kHz. Level indication will be 0.0±0.1.



NOISE WINDOW CHECK

a. Set the calibrator: Frequency 1 kHz
Output 0.23125V, no offset error

b. Set offset error between —0.5 and —0.6% (+0.05 to +0.06 dB).

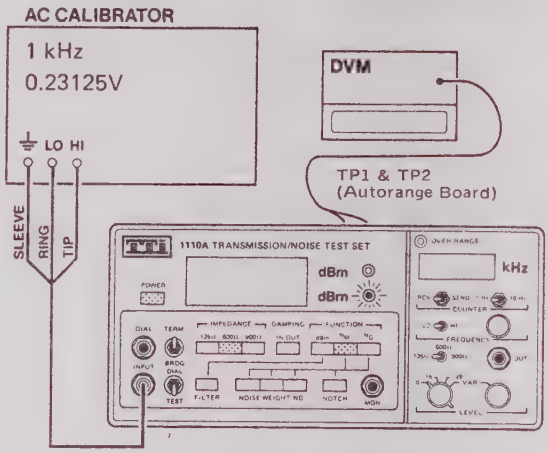
c. 1110A display should read +80 dBm.

d. Set offset error between +0.5 and +0.6% (—0.05 to —0.06 dB).

e. 1110A display should read +79 dBm.

If these readings are obtained, go to the Monitor Output Level Adjustment. Otherwise recalibrate the noise window using the procedure given on the following page.

EQUIPMENT SET-UP



PROCEDURE

NOISE WINDOW ADJUSTMENT

a. Set the ac calibrator: Frequency 1 kHz
Voltage 0.23125V
Offset Error —0.5 to —0.6% (+0.05 to +0.06 dB)

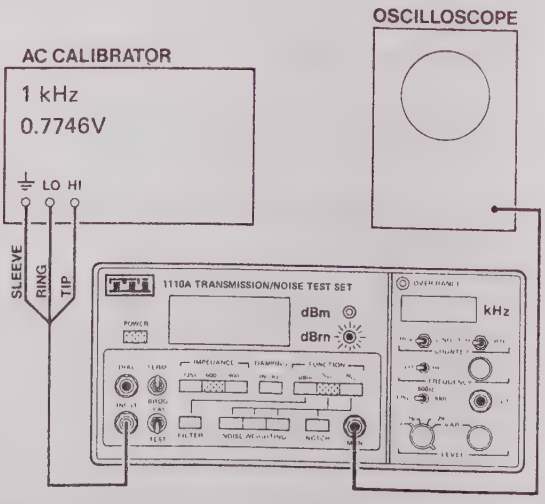
b. Set R64 (foldout #6) fully clockwise.

c. Turn R63 (foldout #5) counterclockwise until the voltage indicated on the DVM goes from 9.9V approximately to 3V. Then turn R63 clockwise until the DVM changes back to 9.9V.

d. Adjust the offset error to —0.5 to —0.6% (+0.05 to +0.06 dB). Adjust R64 to switch the window from —10V to —3.162V approximately.

e. Set offset error to +0.5 to +0.6% (—0.05 to —0.06 dB). Adjust R63 to switch window from approximately —3.162 to approximately —10.0V.

f. Repeat steps (d) and (e) until the window will change from —10.0V to —3.162V approximately with an offset error +0.5 to +0.6%, and from approximately —3.162V to approximately —10.0V with an offset error of —0.5 to —0.6%.

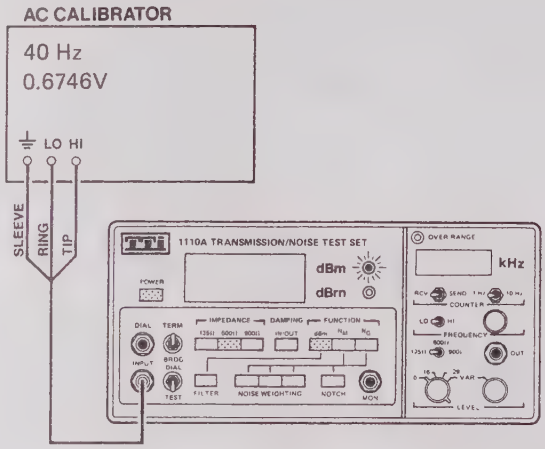
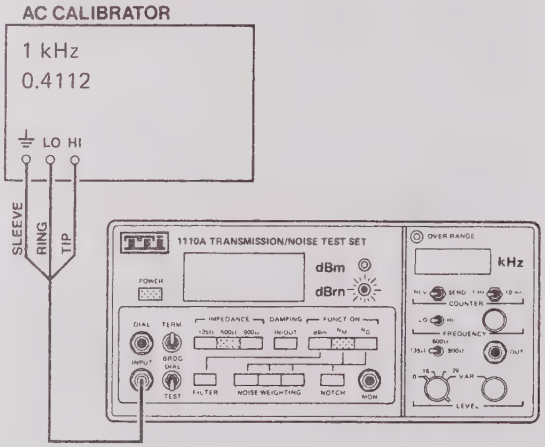
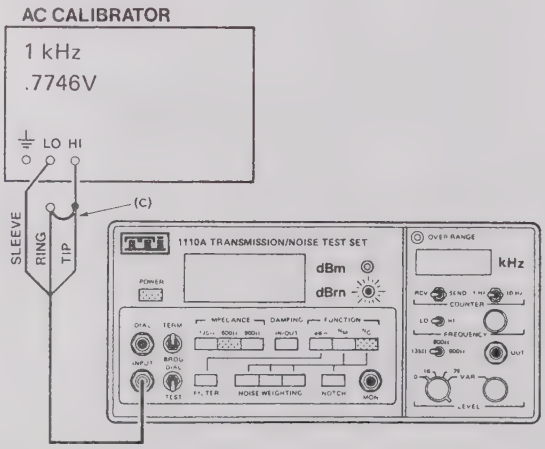


MONITOR OUTPUT LEVEL ADJUSTMENT

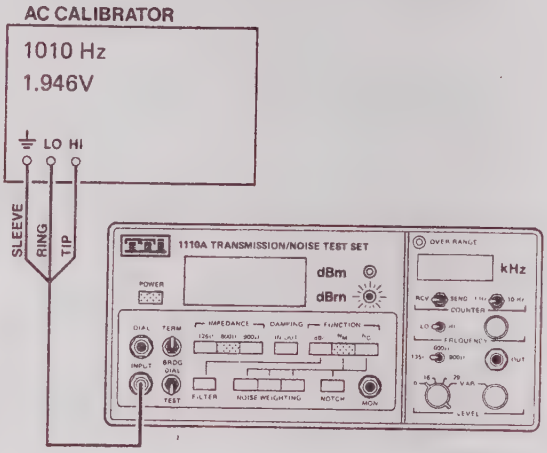
a. Set ac calibrator: Frequency 1 kHz
Voltage 0.7746V, no offset error

b. Connect the Oscilloscope to the tip of Monitor Jack (MON). (There is also a connection to a terminal block on the rear panel.)

c. Adjust R89 for a 2V peak-to-peak indication. (Refer to foldout #5.)

EQUIPMENT SET-UP	PROCEDURE
	*LEVEL DAMPING* a. Set ac calibrator to 40 Hz at 0.6746V with no offset error. b. Press Function dBm button. c. Display on 1110A jitters. d. Press damping switch, jitter should disappear or be greatly reduced.
	*NOISE DAMPING* a. Set ac calibrator: Frequency 1 kHz Voltage 0.4112V b. Observe level display while ranging between 0.4112V and 0.04112V. Note that the digits change quickly. c. While pressing damping button, repeat (b). Digits will be observed rolling before stabilizing at the new level.
	*GROUND NOISE CHECK* a. Set ac calibrator: Frequency 1 kHz Voltage 0.7746V b. On 1110A press Noise Ground (N_g) button. dBrn lamp lights. c. Connect tip and ring to HI side on calibrator and sleeve to LO. 1110A display should read 50 dBm. d. Remove tip to ring short.

EQUIPMENT SET-UP



PROCEDURE

1010 Hz NOTCH FILTER CHECK

a. Set ac calibrator: Frequency 1010 Hz
Voltage Out 1.946V, no offset error

b. Press NOTCH button. Display reads ⩽48 dBrn.

c. Set ac calibrator to 300 Hz. Display reads +98 ±1 dBrn.

d. Set ac calibrator to 3 kHz. Display reads +98 ±1 dBrn.

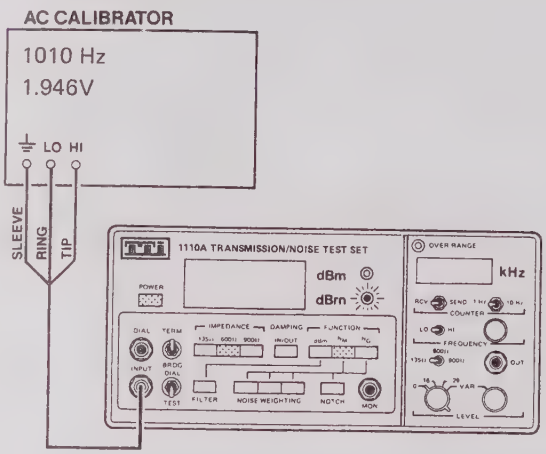
e. Set the ac calibrator to 800 Hz, then with the NOTCH button depressed, sweep the frequency through to 1140 Hz. At each frequency detailed in Table 4-3 below, check that the level indicated on the 1110A display is within the limits shown.

Table 4-3. Notch Profile

Frequency	1110A Display dBrn
⩽800	95
⩽987	48
⩽995	48
⩾1025	48
⩾1032	48
⩾1135	95

If these figures are accurate, the notch filter does not need adjustment; go to Filter Checks section and continue checks and adjustments. If the notch is not within specification, adjust the notch as described on following page.

EQUIPMENT SET-UP



PROCEDURE

1010 Hz NOTCH FILTER ADJUSTMENT

NOTE

This adjustment is to be performed only if the test set fails the previous NOTCH filter check.

a. Remove IC4, IC8, IC18 from the Filter Board.

b. Set ac calibrator: Frequency 1010 Hz
Voltage Out 1.946V, no offset error

c. Connect the ac calibrator to Filter Board TP3 (Tip) and ground (Ring). Ground the sleeve lead.

d. Connect Scope to Filter Board TP4.

e. Push the NOTCH button on the 1110A.

f. Adjust R29 for minimum peak-to-peak volts on the Scope.

g. Replace IC8.

h. Connect the ac calibrator to Filter Board TP2 (Tip) and ground (Ring). Ground the sleeve lead.

j. Connect Scope to Filter Board TP3.

k. Push the NOTCH button on the 1110A.

l. Adjust R18 for minimum peak-to-peak voltage.

m. Replace IC4.

n. Connect the ac calibrator to Filter Board TP1 (Tip) and ground (Ring). Ground the sleeve lead.

p. Connect the Scope to Filter Board TP2.

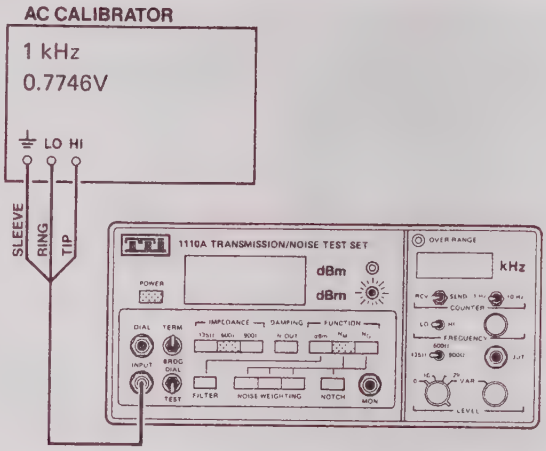
q. Push the NOTCH button on the 1110A.

r. Adjust R7 for minimum peak-to-peak voltage.

s. Replace IC18.

t. Repeat the 1010 Hz Notch Filter Check to determine whether the test set is now within specification.

EQUIPMENT SET-UP



PROCEDURE

FILTER CHECKS

The 1110A may be equipped with three of five noise weighting networks: C-message, 3-kHz Flat, 15-kHz Flat, 50-kb/s Data, or Program. Refer to Tables 4-4 through 4-8 for appropriate data when performing these checks.

a. With ac calibrator set at 0.7746V, check the dBrn readings on the 1110A at these frequencies:

Table 4-4. C-MSG Filter Check

AC Calibrator Frequency	1110A Indication (dBrn)
60 Hz	+90±2
1 kHz	+90±0
2 kHz	+89±2
3 kHz	+87±3
60 kHz	+40 max.

Table 4-5. 3 kHz Flat Filter Check

AC Calibrator Frequency	1110A Indication (dBrn)
60 Hz	+35±2
1 kHz	+90±0
3.3 kHz	+85±2
5 kHz	+62±3
15 kHz	+30 max.

Table 4-6. 15 kHz Flat Filter Check

AC Calibrator Frequency	1110A Indication (dBrn)
60 Hz	90±2
1 kHz	90±0
10 kHz	89±2
15 kHz	87±3
30 kHz	78±3
60 kHz	+40 max.

Table 4-7. 50 kb/s Data Filter Check

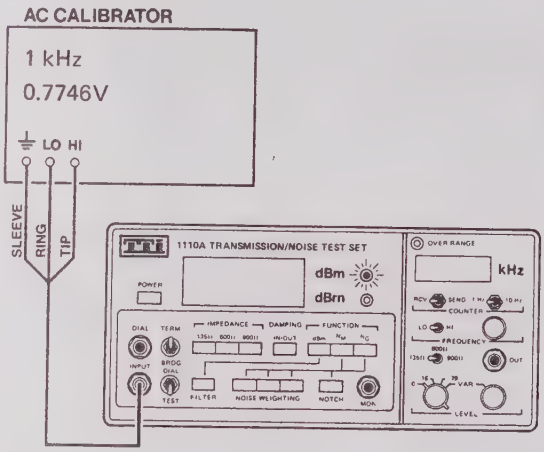
AC Calibrator Frequency	1110A Indication (dBrn)
100 Hz	89±1
1000 Hz	90±0
5000 Hz	90±1
10000 Hz	90±1
25000 Hz	88±1
35000 Hz	85±2
45000 Hz	75±3
50000 Hz	62±3
52500 Hz	55±3
55000 Hz	52±3

(Continued)

EQUIPMENT SET-UP	PROCEDURE

Table 4-8. Program Filter

AC Calibrator Frequency	1110A Indication (dBrn)
100 Hz	64±2
1 kHz	90±0
7 kHz	96±2
50 kHz	30 max.



FREQUENCY COUNTER CALIBRATION

For this test the Oscillator/Counter Assembly MUST be installed in the 1110A mainframe to provide proper grounding. See the Reassembly instructions in Section 3.05.

a. Set the ac calibrator: Frequency 1 kHz
Voltage Out 0.7746V,
no offset error

The 1110A test set reads 0.0 dBm 1 kHz ±1 Hz.

b. Switch the COUNTER 1 Hz-10 Hz switch from the 1 Hz to the 10 Hz position. Counter reads the same in each position but to one less significant digit.

c. Increase the frequency input from the ac calibrator. The OVER RANGE lamp lights and the frequency counter reads 00.00 at some point greater than 60 kHz.

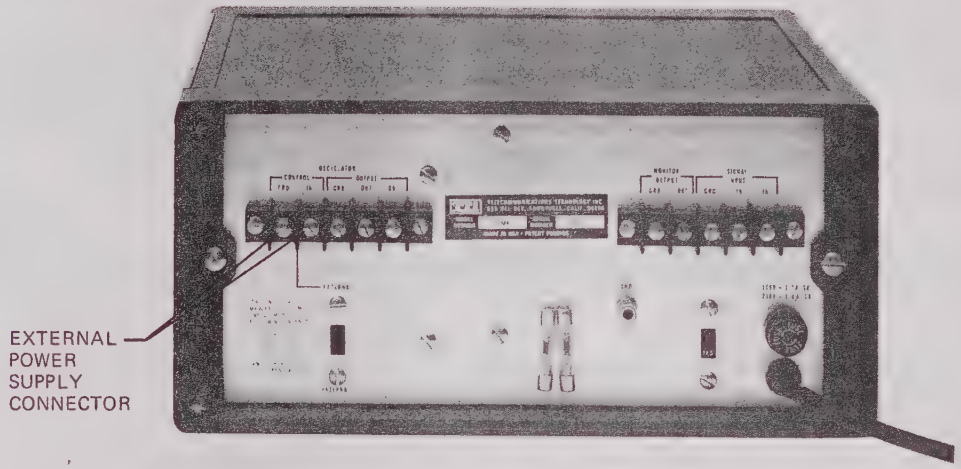
d. Reduce the frequency input. The overrange lamp goes out and the frequency is displayed at about the same frequency at which the lamp came on (c).

e. Set the COUNTER 1 Hz-10 Hz switch to the 1 Hz position. When the frequency increases to 9.999 kHz the OVER RANGE lamp should flash.

f. Reduce the frequency to 35 Hz and verify that the frequency reading is steady. Lamp stops flashing.

g. Switch the DIAL/TEST switch to DIAL. Counter should read 0.000 kHz. Return the DIAL/TEST switch to TEST.

PROCEDURE



OSCILLATOR CALIBRATION

a. Insert a patchcord from INPUT to OUT jack.

b. Connect a 0 to +6V dc power supply to the rear oscillator control terminal.

c. Set the INTERNAL-EXTERNAL switch on the rear panel to EXTERNAL. Verify that the frequency varies with the voltage.

d. Disconnect the external power supply and return the switch to the INTERNAL position.

e. Set the RCV-SEND switch to SEND and set the oscillator on LO band. Adjust the frequency to 1010 Hz. Set the oscillator level range for 0 dBm at 600 ohms impedance.

f. Connect the DVM to E23 (Tip) and E24 (Ring). Adjust R61 for 0.7746±0.0003 volts ac.

g. Set LEVEL control to −16 ±0.1 dBm (foldout #7) output. 1110A display should read −15.9/−16.0 dBm.

h. Set LEVEL control to −29 ±0.1 dBm output. 1110A display should read −28.9/−29 dBm.

j. Set LEVEL switch HI. Rotate the LEVEL VAR adjustment knob through the range from minimum to maximum (+8 to −29 dBm).

k. Switch to LO output. Repeat as for step (j) through a range from (−40 to −10 dBm).

l. Set the LEVEL control to 0 dBm output. Set the oscillator and receiver impedances to 900 ohms. The 1110A display should remain at 0.0 ±0.1 dBm.

m. Repeat step (l) but with both switches set at 135 ohms.

n. Reset both switches to 600 ohms. Set the TERM/BRDG switch to BRDG. The 1110A display should read 6.0 ±0.1 dBm.

p. Set the switch to TERM and depress Function (N_m) button. The 1110A should read 90 dBm.

q. Using the FREQUENCY adjust, set the oscillator frequency to 1010 Hz on HI band.

r. Set counter switch to SEND. Push the 1010 Hz NOTCH in. The 1110A reads +46 dBm or less. If not, adjust R6 (foldout #7), until this figure is reached.

(Continued)

PROCEDURE

s. Switch the FREQUENCY HI/LO switch to LO band. Set the FREQUENCY adjust to 1010 Hz, press the NOTCH 1010 Hz switch, and observe the 1110A display. This should be less than +37 dBrn or less. If not, adjust R22 and R24. Recheck step (r).

t. Switch the LEVEL control to +24 dBrn, press the NOTCH 1010 Hz switch. 1110A should read +24 dBm or less.

u. Set the LEVEL control to +16 dBrn, press the NOTCH 1010 Hz switch. 1110A should read +16 dBm or less. Recheck steps (r), (s), (t) and (u) until all specs are met.

v. Connect the oscillator output to the rear panel receiver input. Set the LEVEL control to LO band. Adjust the frequency as follows and check the 1110A display, pressing the FUNCTION dBm switch.

45 Hz	±0.2 dB
50 Hz	±0.1 dB
100 Hz-3 kHz	±0.0 dB
3.5 kHz	±0.1 dB

w. Set the LEVEL control to HI band. Adjust the frequency response as follows and check the 1110A display.

2 kHz—30 kHz	±0.1 dB
30 kHz—60 kHz	±0.3 dB

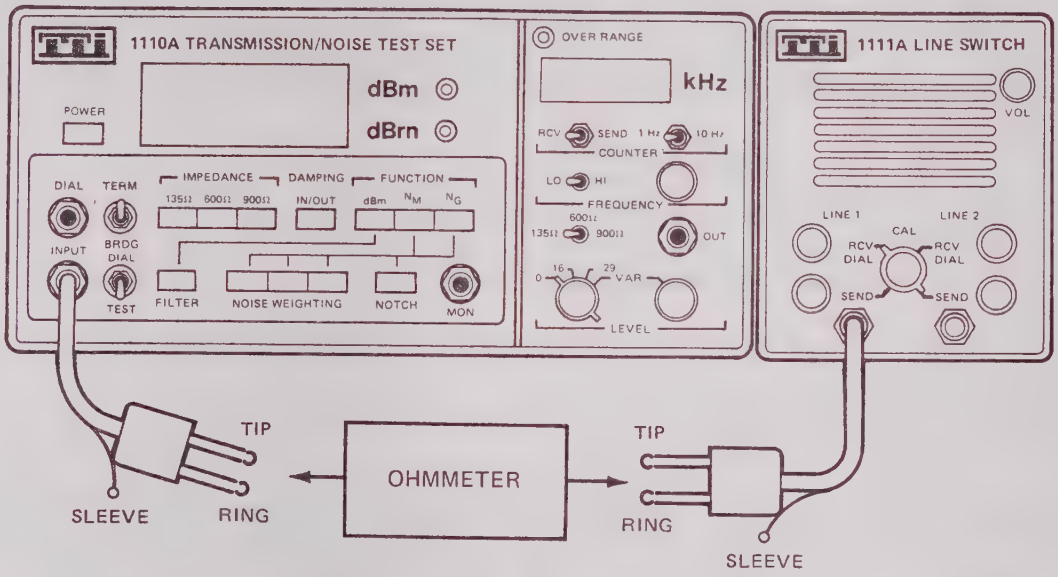
5. TESTING THE 1111A LINE SWITCH

NOTE

This unit is optional and may not be installed on the 1110A Test Set.

5.01 The following procedures are for testing the 1111A Line Switch when equipped with the 1110A. The equipment set-up, together with test procedures are given below. All tests and their respective steps must be performed in the sequence given.

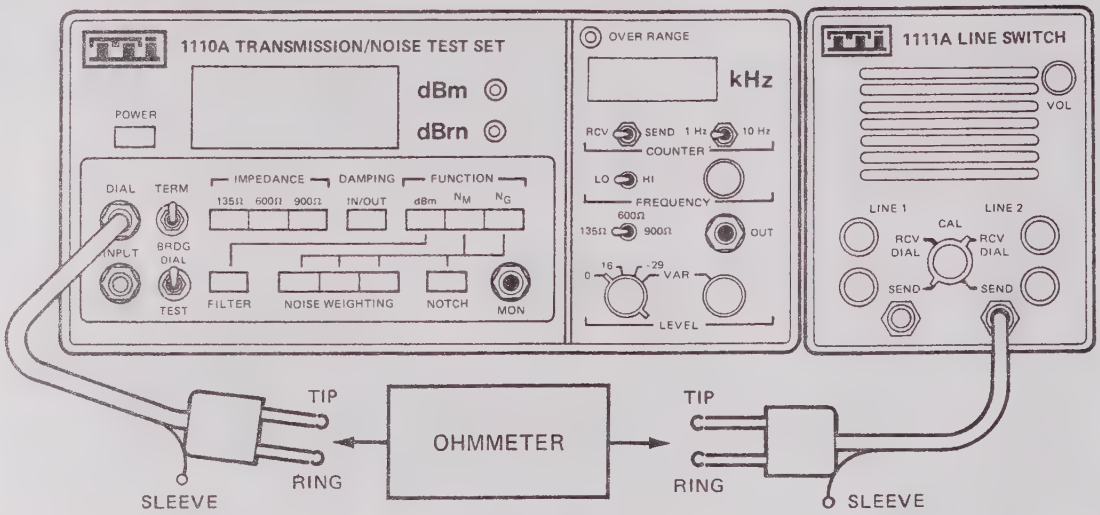
EQUIPMENT SET-UP AND PROCEDURE



CONTINUITY CHECK, INPUT JACK TO 1111A LINE SWITCH

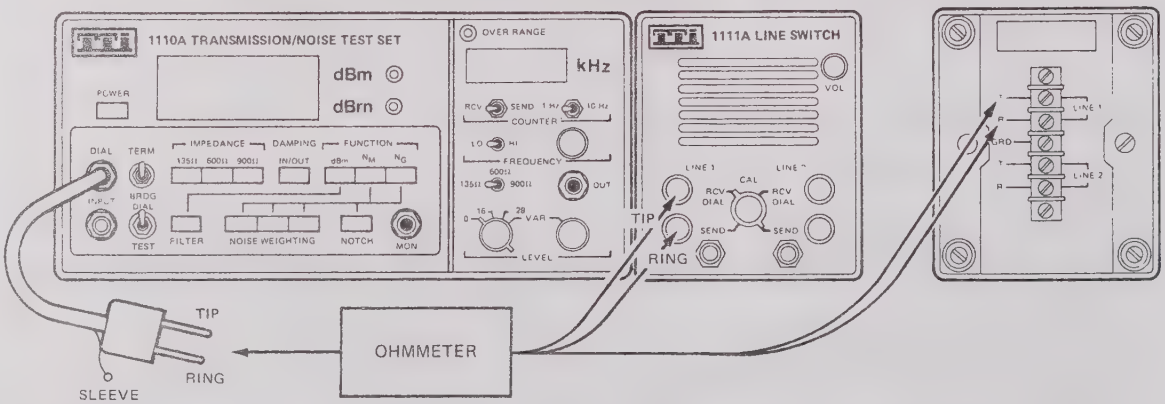
a. Set controls and insert patchcords as shown above.
b. Check tip to tip (closed circuit).
c. Check tip to ring (shows terminating impedance).
d. Check tip to sleeve (open circuit).
e. Check ring to ring (closed circuit).
f. Check ring to tip (shows terminating impedance).
g. Check ring to sleeve (open circuit).
h. Move 1111A patchcord from LINE 1 to LINE 2 position.
j. Set the CAL switch to the LINE 2 RCV position.
k. Check tip to tip (closed circuit).
l. Check tip to ring (shows terminating impedance).
m. Check tip to sleeve (open circuit).
n. Repeat (e) and (g).
p. Set CAL switch in CAL position. Measure tip to ring LINE 1 impedance (600Ω).
q. Check tip to ring impedance LINE 2 (600Ω).

EQUIPMENT SET-UP AND PROCEDURE



CONTINUITY CHECK, DIAL JACK TO 1111A LINE SWITCH

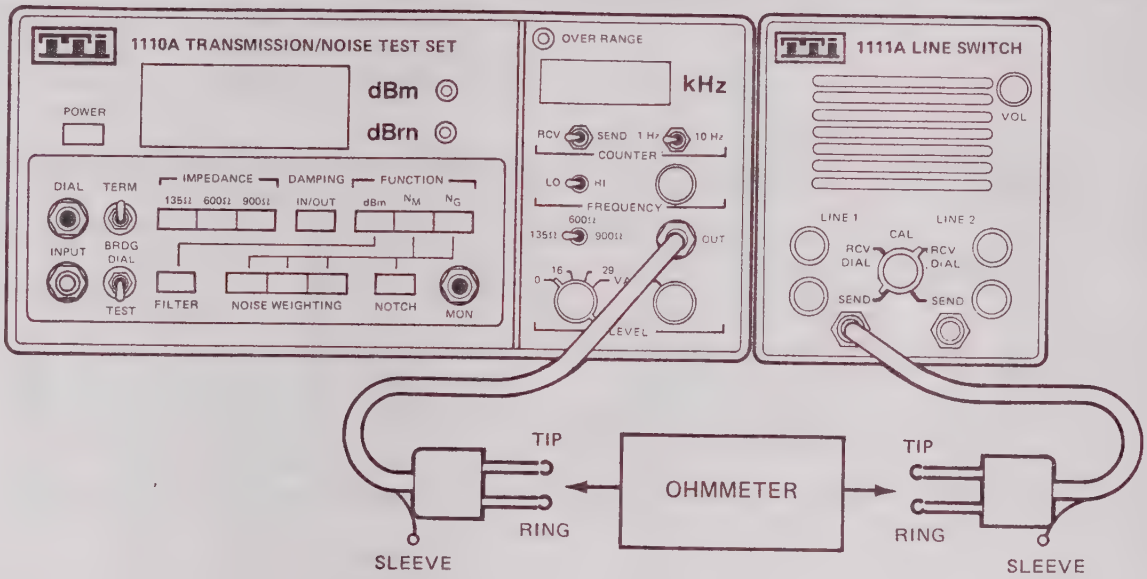
a. Set controls as shown above.
b. Check tip to tip (closed circuit).
c. Check tip to ring (open circuit).
d. Check tip to sleeve (open circuit).
e. Check ring to ring (closed circuit).
f. Check ring to tip (open circuit).
g. Check ring to sleeve (open circuit).



CONTINUITY CHECK, DIAL/INPUT JACK TO 1111A PARALLEL CONNECTIONS

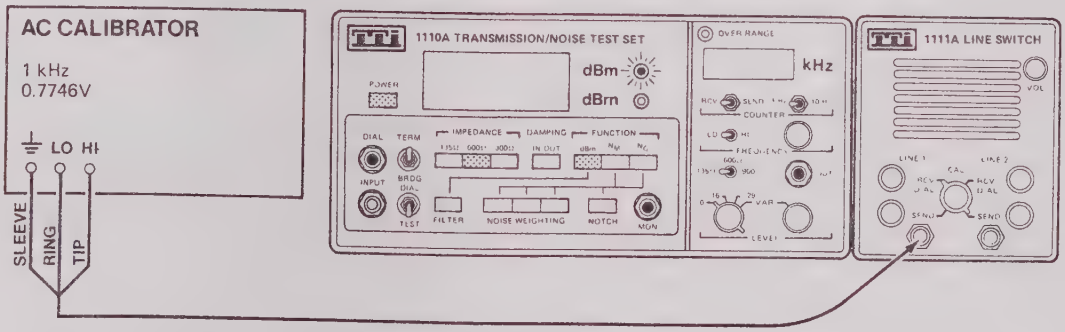
a. Set controls as shown and remove the 310 jack patchcord from the 1111A Line Switch.
b. Check tip to tip on the front and rear panels (closed circuit).
c. Check tip to ring on front and rear panels (open circuit).
d. Check tip to (GRD) on rear panel (open circuit).
e. Check ring to ring (closed circuit).
f. Check ring to tip (shows terminating impedance).
g. Check ring to GRD on rear panel (open circuit).
h. Set the CAL switch to LINE 2 RCV position.
j. Check ring to Line 2 ring on front and rear panels (closed circuit).
k. Check ring to tip (2 places).
l. Check ring to GRD (1 place).
m. Check tip to tip (2 places).
n. Check tip to ring (2 places).
p. Check tip to GRD (1 place).

EQUIPMENT SET-UP AND PROCEDURE



CONTINUITY CHECK, OSCILLATOR

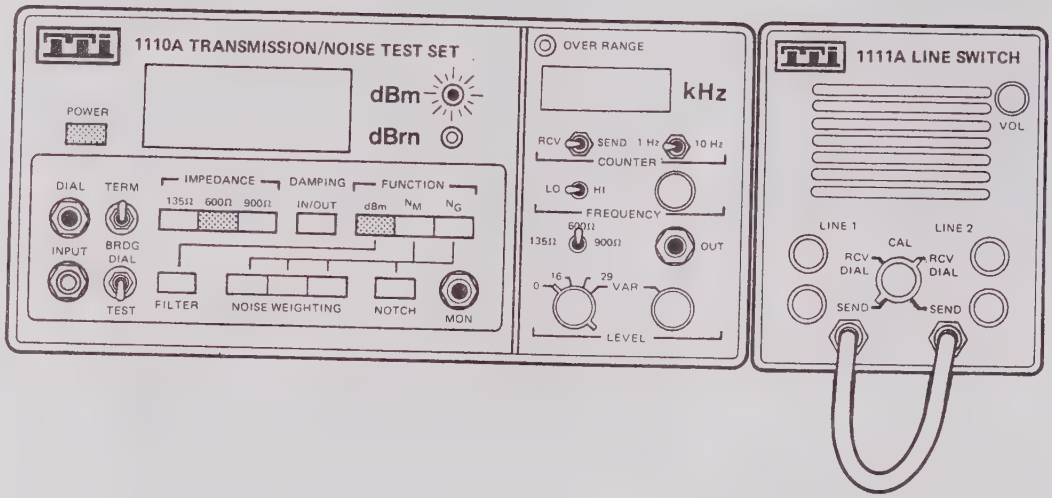
a. Set controls and patchcords as shown.
b. Check tip to tip from Oscillator OUT to LINE 1 SEND (closed circuit).
c. Check tip to ring (open circuit).
d. Check tip to sleeve (open circuit).
e. Check ring to ring (closed circuit).
f. Check ring to tip (open circuit).
g. Check ring to sleeve (open circuit).
h. Set CAL switch to LINE 2 SEND. Patch cord to LINE 2.
j. Check tip to tip (closed circuit).
k. Check tip to ring (open circuit).
l. Check tip to sleeve (open circuit).
m. Check ring to ring (closed circuit).



INPUT LEVEL CHECK

a. Connect 1110A to ac power and switch 1110A Power switch on (out).
b. Connect a patchcord from the calibrator to the 1111A input.
c. Connect a signal source as shown above.
d. Set ac calibrator: 1 kHz
0.7746V.
e. Set the CAL switch to LINE 1 RCV. 1110A Test Set should read 0.0 dBm.
f. Turn the VOL control until the tone is audible.
g. Move the patchcord input to the LINE 2.
h. Set the CAL switch to LINE 2 RCV. 1110A Test Set should display 0.0 dBm.

EQUIPMENT SET-UP AND PROCEDURE



FREQUENCY AND LEVEL CHECK

a. Set the controls and connect a patchcord as shown. 1110A displays level selected on the oscillator front panel.
b. With patch cord removed, set CAL switch to CAL. 1110A display same as (a).
c. Set CAL switch to LINE 1 RCV. 1110A display as in (a).

6. FOLD-OUTS AND PARTS LISTS

6.01 This section contains all fold-out drawings and parts lists to be used in the calibration of the 1110A Transmission/Noise Test Set and 1111A Line Switch.

6.02 The fold-outs are identified by number and circuit board or assembly name. The fold-outs presented in this section are listed below:

FOLD-OUT NO.	NAME
1a	A.C. Power Supply Board
1b	A.C. Power Supply Board
1c	D.C. Power Supply Board
2a	Assembly A.C. Power Supply
2b	A.C. Power Supply
2c	Assembly D.C. Power Supply
3	Auto Range Logic Board
4	Digital Board
5	Level Analog Board
6	Filter Board
7	Oscillator Board
8	Frequency Counter Board
9	Display Board
10	Final Assembly Transmission/Noise Test Set
11	1111A Line Switch Amplifier Board
12	Interconnect Diagram Transmission/Noise Test Set
13	Interconnect Diagram 1111A Line Switch

6.03 Just preceding each schematic fold-out is a corresponding parts list. The parts lists gives information pertinent to the replacement of electrical and mechanical components located on the printed circuit boards. Parts lists contained in this section are listed below.

PARTS LIST	CORRESPONDING FOLD-OUT
Table 6-1. A.C. Power Supply Circuit Board	1a and 1b
Table 6-2. D.C. Power Supply Circuit Board	1c
Table 6-3. Assembly, A.C. Power Supply	2a and 2b
Table 6-4. Assembly, D.C. Power Supply	2c
Table 6-5. Auto Range Logic Circuit Board	3
Table 6-6. Digital Circuit Board	4
Table 6-7. Level Analog Circuit Board	5
Table 6-8. Filter Circuit Board	6
Table 6-9. Oscillator Circuit Board	7
Table 6-10. Frequency Counter Circuit Board	8
Table 6-11. Final Assembly, Transmission/Noise Test Set	10
Table 6-12. 1111A Line Switch Amplifier Board	11

Table 6-1. A.C. Power Supply Circuit Board Parts List

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
C1		910200076	25088	B41010/1000/40/8218	CAPACITOR, ELECTROLYTIC, 1000UF, 40V	2	
C2		910100004	71590	UK25-503	CAPACITOR, CER.DISC, .05UF, 25V	5	
C3		910200058	56289	196D156X0035PE4	CAPACITOR, ELECTROLYTIC, 15UF, 35V	3	
C4		910200076	25088	B41010/1000/40/8218	CAPACITOR, ELECTROLYTIC, 1000UF, 40V	-	
C5		910100004	71590	UK25-503	CAPACITOR, CER.DISC, .05UF, 25V	-	
C6		910200058	56289	196D156X0035PE4	CAPACITOR, ELECTROLYTIC, 15UF, 35V	-	
C7		910200078	25088	B41010/4700/16/8218	CAPACITOR, ELECTROLYTIC, 4700UF, 16V	1	
C8		910100004	71590	UK25-503	CAPACITOR, CER.DISC, .05UF, 25V	-	
C9		910200058	56289	196D156X0035PE4	CAPACITOR, ELECTROLYTIC, 15UF, 35V	-	
C10		910200067	Illinois-Elna	315T10	CAPACITOR, ELECTROLYTIC, 10UF, 315V	1	
C11		910100004	71590	UK25-503	CAPACITOR, CER.DISC, .05UF, 25V	-	
C12		910100004	71590	UK25-503	CAPACITOR, CER.DISC, .05UF, 25V	-	
CR1		940200025	03877	IN4004	DIODE	8	
CR2		940200025	03877	IN4004	DIODE	-	
CR3		940200025	03877	IN4004	DIODE	-	
CR4		940200025	03877	IN4004	DIODE	-	
CR5		940200025	03877	IN4004	DIODE	-	
CR6		940200025	03877	IN4004	DIODE	-	
CR7		940200025	03877	IN4004	DIODE	-	
CR8		940200025	03877	IN4004	DIODE	-	
CR9		940200002	03877	IN825	DIODE, ZENER	1	
CR10		940200032	NPC	IN4148	DIODE	1	
IC1					NOT USED		
IC2					NOT USED		
IC3					NOT USED		
IC4		952000155	49956	RC4558DN	I.C., OP AMP	1	

Table 6-1. A.C. Power Supply Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
J1	1	970400010	71785	50-30-B-10	CONNECTOR, 2-SIDE, 30 PIN, P.C.	4	
J2		970400010	71785	50-30-B-10	CONNECTOR, 2-SIDE, 30 PIN, P.C.	-	
J3		970400010	71785	50-30-B-10	CONNECTOR, 2-SIDE, 30 PIN, P.C.	-	
J4		970400010	71785	50-30-B-10	CONNECTOR, 2-SIDE, 30 PIN, P.C.	-	
J5	2	971400001	71785	14 DIP	SOCKET, I.C., 14 PIN	1	
R1		930700474	01121	JANRCR07	RESISTOR, FXD CAR, 470K, 1/4W, 5%	1	
R2		930504990	91637	MFF-1/8	RESISTOR, MTL FILM, 499 OHMS, 1/8W, 1%	1	
R3		930501002	91637	MFF-1/8	RESISTOR, MTL FILM 10.0K, 1/8W, 1%	1	
R4		930505111	91637	MFF-1/8	RESISTOR, MTL FILM, 5.11K, 1/8W, 1%	2	
R5		920200202	73138	89PR2K	RESISTOR, VARIABLE, 2K	1	
R6		930506040	91637	MFF-1/8	RESISTOR, MTL FILM, 604 OHMS, 1/8W, 1%	1	
R7		930200006	14298	RN60C-50-PPM	RESISTOR, 10.000K, 1/4W, .1%	2	
R8		930200006	14298	RN60C-50-PPM	RESISTOR, 10.000, 1/4W, .1%	-	
R9		930505111	91637	MFF-1/8	RESISTOR, MTL FILM, 5.11K, 1/8W, 1%	-	
	3	P1110-017-02		D-P1110-017-02	P.C.B., REV. A	1	
	4	971200005	00779	86147-2	TERMINAL, STAKING	7	

Table 6-2. D.C. Power Supply Circuit Board Parts List

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
C1		910200076	25088	1000/40/8218	CAPACITOR, ELECTROLYTIC, B41010, 1000UF, 40V	2	
C2		910200078	25088	4700/16/8218	CAPACITOR, ELECTROLYTIC, B41010, 4700UF, 16V	1	
C3		910200076	25088	1000/40/8218	CAPACITOR, ELECTROLYTIC, B41010, 1000UF, 40V	-	
C4		910100005	71590	UK10-104	CAPACITOR, CERAMIC DISK, .1UF, 10V	3	
C5		910100022	71590	UK25-103	CAPACITOR, CERAMIC DISC, .01UF, 25V	3	
C6		910100022	71590	UK25-103	CAPACITOR, CERAMIC DISC .01UF, 25V	-	
C7		910100022	71590	UK25-103	CAPACITOR, CERAMIC DISC, .01UF, 25V	-	
C8		910100005	71590	UK10-104	CAPACITOR, CERAMIC DISC, .1UF, 10V	-	
C9		910100005	71590	UK10-104	CAPACITOR, CERAMIC DISC, .1UF, 10V	-	
C10		910200049	56289	196D476X9020PE4	CAPACITOR, ELECTROLYTIC, 47UF, 20V	1	
C11		910200052	56289	196D336X9010KA1	CAPACITOR, ELECTROLYTIC, 33UF, 10V	1	
C12		910100037		8141-200651104M	CAPACITOR, CERAMIC. (ERIE RED CAP ONLY).1UF 200V	2	[4]
C13		910100037		8141-200651104M	CAPACITOR, CERAMIC DISC,(ERIE RED) .1UF, 200V		
C14		910100004	71590	UK25-503	CAPACITOR, CERAMIC DISC, .05UF, 25V	2	
C15		910100004	71590	UK25-503	CAPACITOR, CERAMIC, DISC, .05UF, 25V	-	
CR1		940200002	03877	1N 825	DIODE, 1N 825	2	
CR2		940200032	03508	1N 4148	DIODE, 1N 4148	11	
CR3		940200025	03877	1N 4004	DIODE, 1N 4004	6	
CR4		940200025	03877	1N 4004	DIODE, 1N 4004	-	
CR5		940200025	03877	1N 4004	DIODE, 1N 4004	-	
CR6		940200025	03877	1N 4004	DIODE, 1N 4004	-	
CR7		940200025	03877	1N 4004	DIODE, 1N 4004	-	
CR8		940200025	03877	1N 4004	DIODE, 1N 4004	-	
CR9		940200002	03877	1N 825	DIODE, 1N 825	-	
CR10		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR11		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR12		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR13		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR14		940200018	03877	1N 4001	DIODE, 1N 4001	3	
CR15		940200018	03877	1N 4001	DIODE, 1N 4001	-	
CR16		940200018	03877	1N 4001	DIODE, 1N 4001	-	
CR17		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR18		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR19		940200032	03508	1N 4148	DIODE, 1N 4148	-	

Table 6-2. D.C. Power Supply Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
CR20		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR21		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR22		940200032	03508	1N 4148	DIODE, 1N 4148	-	
CR23		940200033	04713	MR 2271	DIODE, MR 2271	2	
CR24		940200033	04713	MR 2271	DIODE, MR 2271	-	
1C1		952000019	02735	CA3060E	I.C. CA3060E	1	
1C2		955000005	04713	MC14011	I.C. MC14011	2	
1C3		955000005	04713	MC14011	I.C. MC14011	-	
1C4		952000155	49956	RC4558DN	I.C. RC4558DN	2	
IC5		952000011	27014	741ETC	I.C. 741ETC	1	
1C6		952000155	49956	RC4558DN	I.C. RC4558DN	-	
J1		970400010	71785	50-30-B-10	CONNECTOR, P.C. 30 PIN	4	
J2		970400010	71785	50-30-B-10	CONNECTOR, P.C. 30 PIN	-	
J3		970400010	71785	50-30-B-10	CONNECTOR, P.C. 30 PIN	-	
J4		970400010	71785	50-30-B-10	CONNECTOR, P.C. 30 PIN	-	
J5		971400001	71785	14 DIP	IC SOCKET, 14 PIN	1	
K1		971300026		AZ521-07-2	RELAY, 4 FORM C, AZ 521-07-2	1	[2]
P1		970400063		09-65-1041	CONNECTOR, WAFER, 4 POSITION	1	[1]
P2		970400062		09-65-1051	CONNECTOR, WAFER, 5 POSITION	1	[1]
Q1		961000022	04713	MJE 1092	TRANSISTOR, MJE 1092	3	
Q2		961000022	04713	MJE 1092	TRANSISTOR, MJE 1092	-	
Q3		961000022	04713	MJE 1092	TRANSISTOR, MJE 1092	-	
Q4		960100021	07263	2N4249	TRANSISTOR, 2N4249	4	
Q5		960100021	07263	2N4249	TRANSISTOR, 2N4249	-	
Q6		960100021	07263	2N4249	TRANSISTOR, 2N4249	-	
Q7		960100028	04713	MPSA06	TRANSISTOR, MPSA06	2	
Q8		960100028	04713	MPSA06	TRANSISTOR, MPSA06	-	
Q9		962000005	07263	2N5134	TRANSISTOR, 2N5134	1	
Q10		960100021	07263	2N4249	TRANSISTOR, 2N4249		

Table 6-2. D.C. Power Supply Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
R1		930501002	91637	MFF-1/8	RESISTOR, METAL FILM, 10K, 1/8W, 1%	4	
R2		920200502	73138	89PR5K	RESISTOR, VARIABLE MULTI-TURN 5K	3	
R3		920200502	73138	89PR5K	RESISTOR, VARIABLE MULTI- TURN 5K	-	
R4		920200502	73138	89PR5K	RESISTOR, VARIABLE MULTI-TURN 5K	-	
R5		930504220	91637	MFF-1/8	RESISTOR METAL FILM, 422 OHM, 1/8W, 1%	1	
R6		930505111	91637	MFF-1/8	RESISTOR, METAL FILM, 5.11K, 1/8W, 1%	1	
R7		930503740	91637	MFF-1/8	RESISTOR, METAL FILM, 374 OHM, 1/8W, 1%	1	
R8		930200006	14298	REA-1/4 50PPM	RESISTOR, METAL FILM, 10.000K, 1/4W, .1%	2	
R9		930200006	14298	REA-1/4 50PPM	RESISTOR, METAL FILM, 10.000K, 1/4W, .1%	-	
R10		930504991	91637	MFF-1/8	RESISTOR, METAL FILM, 4.99K, 1/8W, 1%	1	
R11		930504121	91637	MFF-1/8	RESISTOR, METAL FILM, 4.12K, 1/8W, 1%	1	
R12		930510243	01121	JANRCR07	RESISTOR, FIXED CARBON, 24.3 OHM, 1/8W, 1%	3	
R13		930510243	01121	JANRCR07	RESISTOR, FIXED CARBON, 24.3 OHM, 1/8W, 1%	-	
R14		930510243	01121	JANRCR07	RESISTOR, FIXED CARBON, 24.3 OHM, 1/8W, 1%	-	
R15		930501002	91637	MFF-1/8	RESISTOR, METAL FILM, 10K, 1/8W, 1%		
R16		930505901	91637	MFF-1/8	RESISTOR, METAL FILM, 5.9K, 1/8W, 1%	1	
R17		930501002	91637	MFF-1/8	RESISTOR, METAL FILM, 10K, 1/8W, 1%	-	
R18		932400001	91637	RS-1A .1-3%	RESISTOR, WIRE WOUND, 0.1 OHM, 1W, 3%	4	
R19		932400001	91637	RS-1 A .1-3%	RESISTOR, WIRE WOUND, 0.1 OHM, 1W, 3%	-	
R20		932400001	91637	RS-1 A .1-3%	RESISTOR, WIRE WOUND, 0.1Ω, 1W, 3%	-	
R21		932440001	91637	RS-1 A .1-3%	RESISTOR, WIRE WOUND, 0.1Ω, 1W, 3%	-	
R22		930501003	91637	MFF - 1/8	RESISTOR, METAL FILM, 100K, 1/8W, 1%	5	
R23		930502492	91637	MFF - 1/8	RESISTOR, METAL FILM, 24.9K, 1/8W, 1%	1	
R24		930501003	91637	MFF - 1/8	RESISTOR, METAL FILM, 100K, 1/8W, 1%	-	
R25		930501823	91637	MFF - 1/8	RESISTOR, METAL FILM, 182K, 1/8W, 1%	1	
R26		930501003	91637	MFF - 1/8	RESISTOR, METAL FILM, 100K, 1/8W, 1%	-	
R27		930501912	91637	MFF - 1/8	RESISTOR, METAL FILM, 19.1K, 1/8W, 1%	1	
R28		930501003	91637	MFF - 1/8	RESISTOR, METAL FILM, 100K, 1/8W, 1%	-	
R29		920200202	02111	43P202	RESISTOR, VARIABLE, MULTI-TURN, 2K	1	
R30		930508252	91637	MFF - 1/8	RESISTOR, METAL FILM, 82.5K, 1/8W, 1%	1	
R31		930700334	01121	JANRCR07	RESISTOR, FIXED CARBON, 330K, 1/4W, 5%	1	
R32		930501003	91637	MFF - 1/8	RESISTOR, METAL FILM, 100K, 1/8W, 1%	-	
R33		930700102	01121	JANRCR07	RESISTOR, FIXED CARBON, 1K, 1/4W, 5%	1	
R34		930700101	01121	JANRCR07	RESISTOR, FIXED CARBON, 100Ω, 1/4W, 5%	1	
R35		930700563	01121	JANRCR07	RESISTOR, FIXED CARBON, 56K, 1/4W, 5%	2	
R36		930700563	01121	JANRCR07	RESISTOR, FIXED CARBON, 56K, 1/4W, 5%	-	
R37		930700562	01121	JANRCR07	RESISTOR, FIXED CARBON, 5.6K, 1/4W, 5%	1	
R38		930501004	91637	MFF - 1/8	RESISTOR, METAL FILM, 1M, 1.8W, 1%	1	

Table 6-2. D.C. Power Supply Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
R39		930700221	01121	JANRCR07	RESISTOR, FIXED CARBON, 220 OHM, 1/4W, 5%	1	
R40		930501002	91637	MFF-1/8	RESISTOR, METAL FILM, 10K, 1/8W, 1%		
L1		970700001	29466		INDUCTOR, 100 UH	1	
T1		971900038		A-B0001-107-01	TRANSFORMER, CONVERTER, (B0001-107-01)	1	
T2		971900037		A-B0001-106-01	TRANSFORMER, DC-DC CONVERTER OUTPUT	1	
	1	P1103-049-02	TTI	D-P1103-049-02	PRINTED CIRCUIT BOARD REV B	1	
	2	971200005	00779	86147-2	TERMINAL, STAKING	9	

Table 6-3. Assembly, A.C. Power Supply Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES
	1	C-P1110-007-02	DECK, POWER SUPPLY -SILKSCREEN	1	
	2	C-P1110-009-01	BRACKET, POWER SUPPLY DECK	1	
	3	D-P1110-016-02	ASSEMBLY, POWER SUPPLY BOARD NO.3	1	
	4	952000168	I.C. - REGULATOR (7815)	2	IC1 IC2
	5	970300004	CORD, POWER	1	
	6	971600015	SWITCH, SLIDING	2	
	7	971900038	TRANSFORMER, POWER	1	
	8	972100009	FUSE, 1/4 AMP	1	
	9	972100018	FUSE, 1/2 AMP	2	
	10	972200001	HOLDER, FUSE	1	
	11	972200002	CLIP, FUSE	2	
	12	972200004	RETAINER, LINE CORD	1	
	13	972500007	BUSHING, STRAIN RELIEF	1	
	14	972500008	TERMINAL BLOCK	2	
	15	972500040	BINDING POST	1	
	16	612	BRACKET, ANGLE (KEYSTONE)	4	
	17	NO. 6	LUG, SOLDER	1	
	18	952000164	I.C. REGULATOR (7805)	1	IC3
	19	AD43BS	RIVET, POP (USM)	4	
	20	4-40 x 1/4	SCREW, BINDER HD, SST	4	
	21	4-40 x 3/8	SCREW, BINDER HD, SST	3	
	22	6-32 x 3/8	SCREW, BINDER HD, SST	8	
	23	6-32 x 5/8	SCREW, BINDER HD, SST	4	
	24	NO. 4	WASHER, LOCK, INTL TOOTH	4	
	25	4-40	NUT, KEP	3	
	26	6-32	NUT, KEP	12	
	27	PLT1M	CABLE TIE (PANDUIT)	A/R	
	28	1.100	INSULATOR, SILICON RUBBER	1	
	REF	T1110-004-01	WIRING DIAGRAM, A.C. POWER SUPPLY	---	

Table 6-3. Assembly, A.C. Power Supply Parts List (Cont.)

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
	1	P1110-016-02			ASSEMBLY BOARD AC POWER SUPPLY	1	
	2	P1103-033-03			DECK POWER SUPPLY	1	
	3	P1103-033-02			DECK POWER SUPPLY	1	
	4	#6			LUG SOLDER	1	
	5	P1200-006-01			PLATE COVER	1	
	6	972500008			TERMINAL BLOCK	2	
	7	972500007			BUSHING STRAIN RELIEF	1	
	8	970300004			CORD POWER	1	
	9	971600015			SWITCH SLIDING	2	
	10	972100018			FUSE 1/2 AMP	2	
	11	972100009			FUSE 1/4 AMP	1	
	12	952000168		7815	IC REGULATOR	2	IC1,2
	13	972200001			HOLDER FUSE	1	XF1
	14	972200002			CLIP FUSE	2	
	15	#6-32 x 3/8			SCREW PAN HD. SST	2	
	16	#6-32 x 5/8			SCREW PAN HD. SST	4	
	17	#4-40 x 3/8			SCREW FLAT HD SST	3	
	18	#4-40 x 1/4			SCREW PAN HD. SST	4	
	19	972500040			BINDING POST	1	
	20	971900038			TRANSFORMER POWER	1	T1
	21	KEYSTONE 612			BRACKET ANGLE	4	
	22	AD 43 BS			RIVET POP USM	8	
	23	#6			WASHER FLAT	2	
	24	#4			WASHER LOCK INTL. TOOTH	4	
	25	#6-32			NUT KEP	6	
	26	#4-40			NUT KEP	3	
	27	972200004			RETAINER LINE CORD	1	
	28	E22			WIRE AWG 22 STRANDED	AR	
	29	1/8 DIA			TUBING HEAT SHRINKABLE	AR	
	30	1-100			INSULATOR SILICON RUBBER	1	
	31	952000164		7805	IC REGULATOR	1	IC3

Table 6-4. Assembly, D.C. Power Supply Parts List

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
	1	P1103-048-04			ASSEMBLY POWER SUPPLY BOARD	1	
	2	P1103-040-02			REAR DECK	1	
	3	P1103-041-01			SUPPORT BATTERY	1	
	4	P1103-044-01			BRACKET, BATTERY COVER	1	
	5	P1103-042-01			SEPARATOR, BATTERY	1	
	6	P1103-043-01			COVER BOTTOM	1	
	7	P1103-045-01			COVER TOP	1	
	8	P1103-067-01			ASSEMBLY, BATTERY PACKAGE	1	B2,3
	9	P1103-067-02			ASSEMBLY, BATTERY PACKAGE	1	B1,4
	10	970300004			POWER CORD	1	
	11	972200004			RETAINER LINE CORD	1	
	12	971900038			TRANSFORMER	1	T1
	13	972100007			FUSE 1/2A SLO-BLO	1	F1
	14	972200001			FUSEHOLDER	1	XF1
	15	972500040			BINDING POST, METAL HHS#137	1	
	16						
	17	961000022		MJE 1092	TRANSISTOR POWER	3	Q1,2,3
	18	KEYSTONE 612			ANGLE BRACKET	6	
	19	AWG 22			WIRE STRANDED	AK	
	20	1/4 INCH			CABLE CLAMP PLASTIC	1	
	21	AD 43 BS			POP RIVET	8	
	22	P1103-070-01			SHEET INSULATION	1	
	23						
	24	#4-40 x 1/4			SCREW BIND. HD. SST	2	
	25	#4-40 x 9/16			SCREW BIND. HD. SST	2	
	26	#6-32 x 1/4			SCREW BIND. HD. SST	8	
	27	#6-32 x 5/16			SCREW BIND. HD. SST	2	
	28	#6-32 x 3/8			SCREW BIND. HD. SST	5	
	29						
	30						
	31	#4			NUT KEP	2	
	32	#6			NUT KEP	7	
	33	#4			WASHER LOCK	4	
	34	#6			WASHER LOCK	8	

Table 6-5. Auto Range Logic Circuit Board Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C1		910100004	CAPACITOR, DISK, .05UF, 25V	9		71590	UK25-503
C2		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C3		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C4		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C5		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C6		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C7		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C8		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
C9		910100004	CAPACITOR, DISK, .05UF, 25V			71590	UK25-503
CR1		940200032	DIODE IN4148	2		03508	1N4148
CR2		940200032	DIODE IN4148			03508	1N4148
IC1		954000001	INT. CKT, QUAD NAND GATE, SN74L00N	3		01295	SN74L00N
IC2		954000002	INT. CKT, NOR GATE, SN74L02N	2		01295	SN74L02N
IC3		954000007	INT. CKT, JK FF, SN74L73N	1		01295	SN74L73N
IC4		954000001	INT. CKT, QUAD NAND GATE, SN 74L00N			01295	SN74L00N
IC5		954000002	INT. CKT, NOR GATE, SN74L02N			01295	SN74L02N
IC6		954000003	INT. CKT, HEX INVERTER, SN74L04N	1		01295	SN74L04N
IC7		954000008	INT. CKT, QUAD EXCLUSIVE-OR, SN74L86N	2		01295	SN74L86N
IC8		954000016	INT. CKT, JK-FF SN74L72N	1		01295	SN74L72N
IC9		954000004	INT. CKT, TRIPLE NAND GATE, SN74L10N	1		01295	SN74L10N
IC10		954000001	INT. CKT, QUAD NAND GATE, SN74L00N			01295	SN74L00N
IC11		954000006	INT. CKT, DUAL AND-OR-INVERT GATE, SN74L51N	1		01295	SN74L51N
IC12		954000008	INT. CKT, QUAD EXCLUSIVE-OR, SN74L86N			01295	SN74L86N
IC13		952000011	INT. CKT, OP AMP 741CN	3		27014	741CN
IC14		952000011	INT. CKT, OP AMP 741CN			27014	741CN
IC15		952000011	INT. CKT, OP AMP 741CN			27014	741CN
IC16		954000011	INT. CKT, 4 BIT DATA SEL/STORE SN74L98N	1		01295	SN74L98N
R1		930200004	RESISTOR, METAL FILM, 6.838K, 1/4W, ±0.1%	1		14298	REA-1/4 50PPM
R2		930200003	RESISTOR, METAL FILM, 3.162K, 1/4W, ±0.1%	1		14298	REA-1/4 50PPM
R3		930503121	RESISTOR, METAL FILM, 3.16K, 1/8W, ± 1%	1		91637	MFF-1/8
R4		930504421	RESISTOR, METAL FILM, 4.42K, 1/8W, ± 1%	4		91637	MFF-1/8
R5		930504421	RESISTOR, METAL FILM, 4.42K, 1/8W, ± 1%			91637	MFF-1/8
R6		930504421	RESISTOR, METAL FILM, 4.42K, 1/8W, ± 1%			91637	MFF-1/8
R7		930504421	RESISTOR, METAL FILM, 4.42K, 1/8W, ± 1%			91637	MFF-1/8
R8		930700182	RESISTOR, COMPOSITION, 1.8K 1/4W, ± 5%	2		01121	JANRCR07
R9		930700182	RESISTOR, COMPOSITION, 1.8K, 1/4W, ± 5%			01121	JANRCR07
R10		930700561	RESISTOR, COMPOSITION, 560, 1/4W, ± 5%	2		01121	JANRCR07
R11		930700561	RESISTOR, COMPOSITION, 560, 1/4W, ± 5%			01121	JANRCR07
R12		930700152	RESISTOR, COMPOSITION, 1.5K, 1/4W, ± 5%	1		01121	JANRCR07
R13		930700222	RESISTOR, COMPOSITION, 2.2K, 1/4W, ± 5%	1		01121	JANRCR07

Table 6-5. Auto Range Logic Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R14		930700102	RESISTOR, COMPOSITION, 1.0K, 1/4W, ± 5%	1		01121	JANRCR07
	1	D-P1105-003-01	PRINTED CIRCUIT BOARD, REV C	1		TTI	P1105-003-01
	2	971200005	TERMINAL, STAKE	2		00779	86147-2
	3	971400007	SOCKET, INT. CKT, 8 PIN DIP	3		00779	583640-1
	4	971400001	SOCKET, INT. CKT, 14 PIN DIP	2		71785	14 D.I.P.

Table 6-6. Digital Circuit Board Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C1		910100004	CAPACITOR, CERAMIC DISK, .05uf 25V	5		71590	UK25-503
C2		910100004	CAPACITOR, CERAMIC DISK, .05uf 25V			71590	UK25-503
C3		910700001	CAPACITOR, POLYCARB, .068uf 50V	1		IMB	BP2440J
C4		910100004	CAPACITOR, CERAMIC DISK, .05uf 25V			71590	UK25-503
C5		910100004	CAPACITOR, CERAMIC DISK, .05uf 25V			71590	UK25-503
C6		912200007	CAPACITOR, TRIMMER, 10.0/40pf	1		STETTLER TRUSH	10S-TRIM-22
C7			NOT USED				
C8		910100004	CAPACITOR, CERAMIC DISC, .05uf, 25V			71590	UK25-503
C9		910500011	CAPACITOR, MYLAR, .15uf 100V	1		IMB	ZA2B154J
C10		910100027	CAPACITOR, CERAMIC DISC, .001uf 1KV	1		71590	DD102
C11		910100003	CAPACITOR, CERAMIC DISC, .01uf 50V	2		71590	CK-103
C12		910100003	CAPACITOR, CERAMIC DISC, .01uf 50V			71590	CK-103
C13		910200039	CAPACITOR, ELECTROLYTIC, 1uf 450V	1		56289	TVA1700
C14		910700003	CAPACITOR, POLYSTYRENE, .047uf 250V	1		34553	C280AE/A47K
C15		910200056	CAPACITOR, TANTALUM, 100uf 10V	1		05397	T36C107010A
C16		910100005	CAPACITOR, CERAMIC DISC, .1uf 10V	7		71590	UK10-104
C17		910100005	CAPACITOR, CERAMIC DISC, .1uf 10V			71590	UK10-104
C18		910100005	CAPACITOR, CERAMIC DISC, .1uf 10V			71590	UK10-104
C19		910100005	CAPACITOR, CERAMIC DISC, .1uf 10V			71590	UK10-104
C20		910100005	CAPACITOR, CERAMIC DISK, .1uf 10V			71590	UK10-104
C21		910100005	CAPACITOR, CERAMIC DISK, .1uf 10V			71590	UK10-104
C22		910100005	CAPACITOR, CERAMIC DISC, .1uf 10V			71590	UK10-104
CR1		940200032	DIODE IN4148	2		03508	1N4148
CR2		940200032	DIODE IN4148			03508	1N4148
CR3			NOT USED				
DS1		940300001	LED WHITE - DIFFUSED	1		50579	RED-LIT7
IC1		950200005	INTEGRATED CIRCUIT SN7405N	2		01295	SN7405N
IC2		954000009	INTEGRATED CIRCUIT SN74L90N	5		01295	SN74L90N
IC3		952000011	INTEGRATED CIRCUIT 741CN	1		27014	741CN
IC4		952000012	INTEGRATED CIRCUIT LM748C	1		27014	LM748C
IC5		954000009	INTEGRATED CIRCUIT SN74L90N			01295	SN74L90N
IC6		954000015	INTEGRATED CIRCUIT SN74L93N	1		01295	SN74L93N
IC7		954000009	INTEGRATED CIRCUIT SN74L90N			01295	SN74L90N
IC8		954000009	INTEGRATED CIRCUIT SN74L90N			01295	SN74L90N
IC9		954000011	INTEGRATED CIRCUIT SN74L98N	1		01295	SN74L98N
IC10		954000009	INTEGRATED CIRCUIT SN74L90N			01295	SN74L90N
IC11		954000005	INTEGRATED CIRCUIT SN74L20N	1		01295	SN74L20N
IC12		950200005	INTEGRATED CIRCUIT SN7405N			01295	SN7405N
IC13		954000003	INTEGRATED CIRCUIT SN74L04N	3		01295	SN74L04N
IC14		954000002	INTEGRATED CIRCUIT SN74L02N	1		01295	SN74L02N
IC15		954000004	INTEGRATED CIRCUIT SN74L10N	2		01295	SN74L10N

Table 6-6. Digital Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
IC16		954000004	INTEGRATED CIRCUIT SN74L10N			01295	SN74L10N
IC17		954000003	INTEGRATED CIRCUIT SN74L04N			01295	SN74L04N
IC18		954000008	INTEGRATED CIRCUIT SN74L86N	1		01295	SN74L86N
IC19		954000001	INTEGRATED CIRCUIT SN74L00N	1		01295	SN74L00N
IC20		950200015	INTEGRATED CIRCUIT SN74141	2		01295	SN74141
IC21		950200015	INTEGRATED CIRCUIT SN74141			01295	SN74141
IC22		954000003	INTEGRATED CIRCUIT SN74L04N			01295	SN74L04N
IC23		954000007	INTEGRATED CIRCUIT SN74L73N	1		01295	SN74L73N
NX1		971800001	NIXIE, NUMERAL B5870S	3		83594	B5870S
NX2		971800001	NIXIE, NUMERAL B5870S			83594	B5870S
NX3		971800001	NIXIE, NUMERAL B5870S			83594	B5870S
NX4		971800002	NIXIE, SYMBOL (+ -) B5866S	1		83594	B5866S
Q1		962000008	TRANSISTOR 2N5138	2		07263	2N5138
Q2		963000003	TRANSISTOR 2N5114	1			P1086E
Q3		962000005	TRANSISTOR 2N5134	2		07263	2N5134
Q4		962000008	TRANSISTOR 2N5138			07263	2N5138
Q5		960100010	TRANSISTOR MPSL01	2		04713	MPSL01
Q6		960100010	TRANSISTOR MPSL01			04713	MPSL01
Q7		962000016	TRANSISTOR MPS-A93	4		04713	MPS A93
Q8		960100029	TRANSISTOR A5T5058	4		01295	A5T5058
Q9		962000016	TRANSISTOR MPS-A93			04713	MPS A93
Q10		960100029	TRANSISTOR A5T5058			01295	A5T5058
Q11		962000016	TRANSISTOR MPS-A93			04713	MPS A93
Q12		960100029	TRANSISTOR A5T5058			01295	A5T5058
Q13		962000016	TRANSISTOR MPS-A93			04713	MPS A93
Q14		960100029	TRANSISTOR A5T5058			01295	A5T5058
Q15		962000005	TRANSISTOR 2N5134			07263	2N5134
R1		930700561	RESISTOR, COMP 560 OHM 5% 1/4W	2		01121	JANRCR07
R2		930700331	RESISTOR, COMP 330 OHMS 5% 1/4W	2		01121	JANRCR07
R3		930700103	RESISTOR, COMP 10K 5% 1/4W	2		01121	JANRCR07
R4		930700103	RESISTOR, COMP 10K 5% 1/4W			01121	JANRCR07
R5		930700472	RESISTOR, COMP 4.7K 5% 1/4W	1		01121	JANRCR07
R6		930501132	RESISTOR, FILM 11.3K 1% 1/8W	1		91637	MFF-1/8
R7		920200502	POTENTIOMETER MULTI-TURN 5K	1		02111	43P502
R8		930700182	RESISTOR, COMP 1.8K 5% 1/4W	2		01121	JANRCR07
R9		930700272	RESISTOR, COMP 2.7K 5% 1/4W	1		01121	JANRCR07
R10		930700561	RESISTOR, COMP 560 OHMS 5% 1/4W			01121	JANRCR07
R11		930700183	RESISTOR, COMP 18K 5% 1/4W	1		01121	JANRCR07
R12			NOT USED				
R13		930700181	RESISTOR, COMP 180 OHMS 5% 1/4W	1		01121	JANRCR07

Table 6-6. Digital Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R14		930700331	RESISTOR, COMP 330 OHMS 5% 1/4W			01121	JANRCR07
R15		930700152	RESISTOR, COMP 1.5K 5% 1/4W	1		01121	JANRCR07
R16		930700273	RESISTOR, COMP 27K 5% 1/4W	13		01121	JANRCR07
R17		930700104	RESISTOR, COMP 100K 5% 1/4W	1		01121	JANRCR07
R18		930502213	RESISTOR, FILM 221K 1% 1/8W	2		91637	MFF-1/8
R19		930502213	RESISTOR, FILM 221K 1% 1/8W			91637	MFF-1/8
R20		930700182	RESISTOR, COMP 1.8K 5% 1/4W			01121	JANRCR07
R21		930700271	RESISTOR, COMP 270 OHMS 5% 1/4W	3		01121	JANRCR07
R22		930700271	RESISTOR, COMP 270 OHMS 5% 1/4W			01121	JANRCR07
R23		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R24		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R25		930700271	RESISTOR, COMP 270 OHMS 5% 1/4W			01121	JANRCR07
R26		930700683	RESISTOR, COMP 68K 5% 1/4W	1		01121	JANRCR07
R27		931600822	RESISTOR, COMP 8.2K 5% 1/2W	3		01121	
R28		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R29		930700474	RESISTOR, COMP 470K 5% 1/4W	6		01121	JANRCR07
R30		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R31		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R32		931600822	RESISTOR, COMP 8.2K 5% 1/2W			01121	
R33		930700474	RESISTOR, COMP 470K 5% 1/4W			01121	JANRCR07
R34		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R35		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R36		931600822	RESISTOR, COMP 8.2K 5% 1/2W			01121	
R37		930700474	RESISTOR, COMP 470K 5% 1/4W			01121	JANRCR07
R38		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R39		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R40		930700153	RESISTOR, COMP 15K 5% 1/4W	1		01121	JANRCR07
R41		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R42		930700474	RESISTOR, COMP 470K 5% 1/4W			01121	JANRCR07
R43		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R44		930700273	RESISTOR, COMP 27K 5% 1/4W			01121	JANRCR07
R45		930700473	RESISTOR, COMP 47K 5% 1/4W	1		01121	JANRCR07
R46		930510499	RESISTOR, FILM 49.9OHMS 1% 1/8W	1		91637	MFF-1/8
R47		930700474	RESISTOR, COMP 470K 5% 1/4W			01121	JANRCR07
R48		930700474	RESISTOR, COMP 470K 5% 1/4W			01121	JANRCR07
S1		971600001	SWITCH, PUSHBUTTON 2 FORM C	1		31918	FSB/BLK2UEE
Y1		970500001	CRYSTAL 1 MHZ	1		94149	CR 18A/U
	1	971400001	IC SOCKET 14 PIN D.I.P.	1		71785	14 D.I.P.
	2	971400002	IC SOCKET 16 PIN D.I.P.	2		71785	16 D.I.P.
	3		NOT USED				
	4		NOT USED				
	5	P1105-006-01	PRINTED CIRCUIT BOARD REV D	1		TTI	P1105-006-01
	6	971200005	TERMINAL, STAKE	9		00779	86147-2

Table 6-7. Level Analog Circuit Board Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C1		910200045	CAPACITOR, TANTALUM 10UF 20V	4		56289	196D106X 9020JA1
C2-C3		910500048	CAPACITOR, MYLAR 6UF, 200V MATCHED	1 SET			230B1C605K
						56289	
C4		910100018	CAPACITOR, DISK 200PF 1KV	3		71590	DD201
C5		910100012	CAPACITOR, DISK 10PF 1KV	4		71590	DD100
C6		910500029	CAPACITOR, POLYCARB .027UF 100V ±1%	3		IMB	BA2B273F
C7		910100012	CAPACITOR, DISK 10PF 1KV			71590	DD100
C8		910500029	CAPACITOR, POLYCARB .027UF 100V ±1%			IMB	BA2B273F
C9		910500029	CAPACITOR, POLYCARB .027UF 100V ±1%			IMB	BA2B273F
C10		910100012	CAPACITOR, DISK 10PF 1KV			71590	DD100
C11		910500013	CAPACITOR, MYLAR .001UF 100V ±1%	2		IMB	BV2B102F
C12		910500013	CAPACITOR, MYLAR .001UF 100V ±1%			IMB	BV2B102F
C13		910100012	CAPACITOR, DISK 10PF 1KV			71590	DD100
C14		910100004	CAPACITOR, DISK .05UF 25V	18		71590	UK25-503
C15		910200052	CAPACITOR, TANTALUM 33UF 10V	2		56289	196D336X 9010KA1
C16		910200052	CAPACITOR, TANTALUM 33UF 10V			56289	196D336X 9010KA1
C17		910100027	CAPACITOR, DISK .001UF 1KV	5		71590	DD102
C18		910100027	CAPACITOR, DISK .001UF 1KV			71590	DD102
C19		910100027	CAPACITOR, DISK .001UF 1KV			71590	DD102
C20		910100027	CAPACITOR, DISK .001UF 1KV			71590	DD102
C21		910100027	CAPACITOR, DISK .001UF 1KV			71590	DD102
C22		910400025	CAPACITOR, SILVER MICA 75PF 500V	1		72136	DM15-750J
C23		910100011	CAPACITOR, DISK 3.3PF 1KV	2		71590	DD3R3
C24		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C25		910200009	CAPACITOR, ELECTROLYTIC N.P. 35UF 6V	1		29309	JA-3-35-6-8N
C26		910100005	CAPACITOR, DISK 0.1UF 10V	2		71590	UK10-104
C27		910100017	CAPACITOR, DISK 100PF 1KV	2		71590	DD101
C28		910100018	CAPACITOR, DISK 200PF 1KV			71590	DD201
C29		910500007	CAPACITOR, MYLAR 0.47UF 100V ±5%	1		IMB	ZA2446J
C30		910100005	CAPACITOR, DISK 0.1UF 10V			71590	UK10-104
C31		910200023	CAPACITOR, ELECTROLYTIC 0.22UF 35V	1		56289	150D224X 9035A
C32		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C33		910200046	CAPACITOR, TANTALUM 22UF, 10V	1		56289	196D226X 9010JA1
C34		910200048	CAPACITOR, TANTALUM 3.9UF 15V	1		56289	196D395X 9015HA1
C35		910200045	CAPACITOR, TANTALUM 10UF 20V			56289	196D106X 9020JA1
C36		910500006	CAPACITOR, MYLAR 0.39UF 100V ±5%	2		IMB	ZA2445J
C37		910500004	CAPACITOR, MYLAR 0.27UF 100V ±5%	2		IMB	ZA2443J
C38		910500004	CAPACITOR, MYLAR 0.27UF 100V ±5%			IMB	ZA2443J
C39		910500006	CAPACITOR, MYLAR 0.39UF 100V ±5%			IMB	ZA2445J
C40		910100002	CAPACITOR, DISK .005UF 100V	1		56289	TGD-50
C41		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C42		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C43		910100018	CAPACITOR, DISK 200PF 1KV			71590	DD201
C44		910100017	CAPACITOR, DISK 100PF 1KV			71590	DD101
C45		910100011	CAPACITOR, DISK 3.3PF 1KV			71590	DD3R3
C46		910200051	CAPACITOR, TANTALUM 220UF 4V	1		56289	196D227X 9004LA3

Table 6-7. Level Analog Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C47		910200045	CAPACITOR, TANTALUM 10UF 20V			56289	196D106X 9020JA1
C48		910200045	CAPACITOR, TANTALUM 10UF 20V			56289	196D106X 9020JA1
C49		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C50		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C51		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C52		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C53		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C54		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C55		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C56		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C57		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C58		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C59		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C60		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C61		910100004	CAPACITOR, DISK .05UF 25V			71590	UK25-503
C62		910100032	CAPACITOR, DISK 0.1UF 20V	2		71590	UK20-104
C63		910200060	CAPACITOR, ELECTROLYTIC 0.47UF 35V	1		56289	196D474X 0035MA1
C64		910100032	CAPACITOR, DISK 0.1UF 20V			71590	UK20-104
CR1		940200032	DIODE IN4148	11		03508	1N4148
CR2		940200032	DIODE IN4148			03508	1N4148
CR3		940200032	DIODE IN4148			03508	1N4148
CR4		940200032	DIODE IN4148			03508	1N4148
CR5		940200032	DIODE IN4148			03508	1N4148
CR6		940200031	DIODE MBD101	2		04713	MBD101
CR7		940200031	DIODE MBD101			04713	MBD101
CR8		940200024	DIODE IN914	2			IN914
CR9		940200024	DIODE IN914				IN914
CR10		940200032	DIODE IN4148			03508	1N4148
CR11		940200032	DIODE IN4148			03508	1N4148
CR12		940200032	DIODE IN4148			03508	1N4148
CR13		940200032	DIODE IN4148			03508	1N4148
CR14		940200032	DIODE IN4148			03508	1N4148
CR15		940200032	DIODE IN4148			03508	1N4148
IC1		952000002	INT. CKT, OP AMP LM709CH	3		27014	LM709CH
IC2		952000017	INT.CCKT, OP AMP SN72748P	3		01295	SN72748P
IC3		952000017	INT. CKT, OP AMP SN72748P			01295	SN72748P
IC4		952000017	INT. CKT, OP AMP SN72748P			01295	SN72748P
IC5		952000002	INT. CKT, OP AMP LM709CH			27014	LM709CH
IC6		952000003	INT. CKT, OP AMP UF57715393	1		07263	U5F7715393
IC7			NOT USED				
IC8		952000011	INT. CKT, OP AMP 741CN	5		27014	741CN
IC9		952000011	INT. CKT, OP AMP 741CN			27014	741CN
IC10		952000011	INT. CKT, OP AMP 741CN			27014	741CN
IC11		952000011	INT. CKT, OP AMP 741CN			27014	741CN

Table 6-7. Level Analog Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
IC12		952000014	INT. CKT, OP AMP 709A	1		27014	709A
IC13		952000002	INT. CKT, OP AMP LM709CH			27014	LM709CH
IC14		952000011	INT. CKT, OP AMP 741CN			27014	741CN
IC15		950200016	INT. CKT, DECODER DRIVER SN74145	1		01295	SN74145
K1		971300017	RELAY, REED 2 FORM C	2		31951	214-002-12
K2		971300017	RELAY, REED 2 FORM C			31951	214-002-12
K3		971300006	RELAY, REED 1 FORM C	1		31951	101-001-12
K4		971300002	RELAY, REED 1 FORM A	5		31951	203-100-12
K5		971300002	RELAY, REED 1 FORM A			31951	203-100-12
K6		971300002	RELAY, REED 1 FORM A			31951	203-100-12
K7		971300002	RELAY, REED 1 FORM A			31951	203-100-12
K8		971300002	RELAY, REED 1 FORM A			31951	203-100-12
L1		970700014	CHOKE, 470 UH	1		72259	WEE-470
Q1		960100012	TRANSISTOR, PNP 2N5139	6		07263	2N5139
Q2		960100012	TRANSISTOR, PNP 2N5139			07263	2N5139
Q3		960100012	TRANSISTOR, PNP 2N5139			07263	2N5139
Q4		960100012	TRANSISTOR, PNP 2N5139			07263	2N5139
Q5		960100007	TRANSISTOR, NPN 2N5210	2		04713	2N5210
Q6		960100007	TRANSISTOR, NPN 2N5210			04713	2N5210
Q7		960100004	TRANSISTOR, PNP 2N5087	2		04713	2N5087
Q8		960100004	TRANSISTOR, PNP 2N5087			04713	2N5087
Q9		963000006	TRANSISTOR, FET N-CHANNEL ITE 4391	6		32293	ITE4391
Q10		963000006	TRANSISTOR, FET N-CHANNEL ITE 4391			32293	ITE4391
Q11		963000006	TRANSISTOR, FET N-CHANNEL ITE 4391			32293	ITE4391
Q12		963000006	TRANSISTOR, FET N-CHANNEL ITE 4391			32293	ITE4391
Q13		962000002	TRANSISTOR, NPN 2N3565	4		07263	2N3565
Q14		963000006	TRANSISTOR, FET N-CHANNEL ITE 4391			32293	ITE4391
Q15		962000008	TRANSISTOR, PNP 2N5138	2		07263	2N5138
Q16		963000006	TRANSISTOR, FET N-CHANNEL ITE 4391			32293	ITE4391
Q17		962000008	TRANSISTOR, PNP 2N5138			07263	2N5138
Q18		962000002	TRANSISTOR, NPN 2N3565			07263	2N3565
Q19		962000002	TRANSISTOR, NPN 2N3565			07263	2N3565
Q20		962000002	TRANSISTOR, NPN 2N3565			07263	2N3565
Q21		960100012	TRANSISTOR, PNP, 2N5139			07263	2N5139
Q22		960100012	TRANSISTOR, PNP, 2N5139			07263	2N5139

Table 6-7. Level Analog Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R1		930400003	RESISTOR, PREC. 135 OHMS 10W ±0.1%	1		12463	N-10
R2		930400001	RESISTOR, PREC. 600 OHMS 5W ±0.1%	1		12463	N-5
R3		930400002	RESISTOR, PREC. 900 OHMS 5W ±0.1%	1		12463	N-5
R4		930504021	RESISTOR, FILM 4.02K 1/8W ±1%	1		91637	MFF-1/8
R5		930509092	RESISTOR, FILM 90.9K 1/8W ±1%	2		91637	MFF-1/8
R6		930509092	RESISTOR, FILM 90.9K 1/8W ±1%			91637	MFF-1/8
R7		930509761	RESISTOR, FILM 9.76K 1/8W ±1%	2		91637	MFF-1/8
R8		920200501	RESISTOR, VARIABLE (MULTI-TURN) 500	2		02111	43P501
R9		930509761	RESISTOR, FILM 9.76K 1/8W ±1%			91637	MFF-1/8
R10		930501213	RESISTOR, FILM 121K 1/8W ±1%	2		91637	MFF-1/8
R11		930501213	RESISTOR, FILM 121K 1/8W ±1%			91637	MFF-1/8
R12		930501212	RESISTOR, FILM 12.1K 1/8W ±1%	3		91637	MFF-1/8
R13		930501212	RESISTOR, FILM 12.1K 1/8W ±1%			91637	MFF-1/8
R14		930504991	RESISTOR, FILM 4.99K 1/8W ±1%	4		91637	MFF-1/8
R15		930504991	RESISTOR, FILM 4.99K 1/8W ±1%			91637	MFF-1/8
R16		930501003	RESISTOR, FILM 100K 1/8W ±1%	11		91637	MFF-1/8
R17		930501501	RESISTOR, FILM 1.5K 1/8W ±1%	4		91637	MFF-1/8
R18		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R19		930200095	RESISTOR, PREC 14.289K 1/4W ±0.1%	1		14298	RN60C
R20		930200096	RESISTOR, PREC 4.763K 1/4W ±0.1%	1		14298	RN60C
R21		930200097	RESISTOR, PREC 23.44 K 1/4W ±0.1%	1		14298	RN60C
R22		930200100	RESISTOR, PREC 27.83K 1/4W ±0.1%	1		14298	RN60C
R23		930200006	RESISTOR, PREC 10K 1/4W ±0.1%	6		14298	REA-1/4 50PPM
R24		930200006	RESISTOR, PREC 10K 1/4W ±0.1%			14298	REA-1/4 50PPM
R25		930200098	RESISTOR, PREC 16.363K 1/4W ±0.1%	1		14298	RN60C
R26		930200099	RESISTOR, PREC 27.788K 1/4W ±0.1%	1		14298	RN60C
R27		930200006	RESISTOR, PREC 10K 1/4W ±0.1%			14298	REA-1/4 50PPM
R28		930200006	RESISTOR, PREC 10K 1/4W ±0.1%			14298	REA-1/4 50PPM
R29		930505621	RESISTOR, FILM 5.62K 1/8W ±1%	2		91637	MFF-1/8
R30		930505621	RESISTOR, FILM 5.62K 1/8W ±1%			91637	MFF-1/8
R31		930200002	RESISTOR, PREC 2.177K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R32		930200005	RESISTOR, PREC 9.264K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R33		930200010	RESISTOR, PREC 33.92K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R34		930200011	RESISTOR, PREC 144.3K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R35		930200012	RESISTOR, PREC 157.6K 1/4W ±0.1%	2		14298	REA-1/4 50PPM
R36		930200012	RESISTOR, PREC 157.6K 1/4W ±0.1%			14298	REA-1/4 50PPM
R37		930504421	RESISTOR, FILM 4.42K 1/8W ±1%	2		91637	MFF-1/8
R38		930200001	RESISTOR, PREC 1K 1/4W ±0.1%	2		14298	REA-1/4 50PPM
R39		930501001	RESISTOR, FILM 1K 1/8W ±1%	4		91637	MFF-1/8
R40		920200203	RESISTOR, VARIABLE (MULTI-TURN) 20K	2		02111	43P203
R41		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R42		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R43		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R44		930501501	RESISTOR, FILM 1.5K 1/8W ±1%			91637	MFF-1/8
R45		930501403	RESISTOR, FILM 140K 1/8W ±1%	1		91637	MFF-1/8

Table 6-7. Level Analog Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R46		930200062	RESISTOR, PREC 7.41K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R47		930200064	RESISTOR, PREC 10.598K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R48		930504992	RESISTOR, FILM 49.9K 1/8W ±1%	2		91637	MFF-1/8
R49		930200006	RESISTOR, PREC. 10K 1/4W ±0.1%			14298	REA-1/4 50PPM
R50		930200001	RESISTOR, PREC. 1K 1/4W ±0.1%			14298	REA-1/4 50PPM
R51		930502000	RESISTOR, FILM 200 OHMS 1/8W ±1%	2		91637	MFF-1/8
R52		930504421	RESISTOR, FILM 4.42K 1/8W ±1%			91637	MFF-1/8
R53		920200501	RESISTOR, VARIABLE (MULTI-TURN) 500 OHMS			02111	43P501
R54		930200008	RESISTOR, PREC. 20K 1/4W ±0.1%	1		14298	REA-1/4 50PPM
R55		930200006	RESISTOR, PREC. 10K 1/4W ±0.1%			14298	REA-1/4 50PPM
R56		930501002	RESISTOR, FILM 10K 1/8W ±1%	7		91637	MFF-1/8
R57		930501002	RESISTOR, FILM 10K 1/8W ±1%			91637	MFF-1/8
R58		930504992	RESISTOR, FILM 49.9K 1/8W ±1%			91637	MFF-1/8
R59		930502000	RESISTOR, FILM 200 OHMS 1/8W ±1%			91637	MFF-1/8
R60		930502152	RESISTOR, FILM 21.5K 1/8W ±1%	5		91637	MFF-1/8
R61		930502152	RESISTOR, FILM 21.5K 1/8W ±1%			91637	MFF-1/8
R62		930504991	RESISTOR, FILM 4.99K 1/8W ±1%			91637	MFF-1/8
R63		920200502	RESISTOR, VARIABLE (MULTI-TURN) 5K	1		02111	43P502
R64		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R65		930501652	RESISTOR, FILM 16.5K 1/8W ±1%	1		91637	MFF-1/8
R66		930506342	RESISTOR, FILM 63.4K 1/8W ±1%	2		91637	MFF-1/8
R67		930506342	RESISTOR, FILM 63.4K 1/8W ±1%			91637	MFF-1/8
R68		930501332	RESISTOR, FILM 13.3K 1/8W ±1%	1		91637	MFF-1/8
R69		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R70		930502152	RESISTOR, FILM 21.5K 1/8W ±1%			91637	MFF-1/8
R71		930502152	RESISTOR, FILM 21.5K 1/8W ±1%			91637	MFF-1/8
R72		930501242	RESISTOR, FILM 12.4K 1/8W ±1%	1		91637	MFF-1/8
R73		930501582	RESISTOR, FILM 15.8K 1/8W ±1%	1		91637	MFF-1/8
R74		930501001	RESISTOR, FILM 1K 1/8W ±1%			91637	MFF-1/8
R75		930502151	RESISTOR, FILM 2.15K 1/8W ±1%	1		91637	MFF-1/8
R76		931600102	RESISTOR, COMP 1K 1/2W ±5%	2		01121	
R77		931600102	RESISTOR, COMP 1K 1/2W ±5%			01121	
R78		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R79		930501212	RESISTOR, FILM 12.1K 1/8W ±1%			91637	MFF-1/8
R80		930507681	RESISTOR, FILM 7.68K 1/8W ±1%	1		91637	MFF-1/8
R81		930501002	RESISTOR, FILM 10K 1/8W ±1%			91637	MFF-1/8
R82		930501501	RESISTOR, FILM 1.5K 1/8W ±1%			91637	MFF-1/8
R83		930506652	RESISTOR, FILM 66.5K 1/8W ±1%	1		91637	MFF-1/8
R84		930504423	RESISTOR, FILM 442K 1/8W ±1%	2		91637	MFF-1/8
R85		930502152	RESISTOR, FILM 21.5K 1/8W ±1%			91637	MFF-1/8
R86		930504423	RESISTOR, FILM 442K 1/8W ±1%			91637	MFF-1/8
R87		930504991	RESISTOR, FILM 4.99K 1/8W ±1%			91637	MFF-1/8
R88		930501152	RESISTOR, FILM 11.5K 1/8W ±1%	1		91637	MFF-1/8
R89		920200203	RESISTOR, VARIABLE (MULTI-TURN) 20K			02111	43P203
R90		930501002	RESISTOR, FILM 10K 1/8W ±1%			91637	MFF-1/8
R91		930501502	RESISTOR, FILM 15K 1/8W ±1%	1		91637	MFF-1/8

Table 6-7. Level Analog Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R92		930501001	RESISTOR, FILM 1K 1/8W ±1%			91637	MFF-1/8
R93		930503013	RESISTOR, FILM 301K 1/8W ±1%	2		91637	MFF-1/8
R94		930501001	RESISTOR, FILM 1K 1/8W ±1%			91637	MFF-1/8
R95		930501501	RESISTOR, FILM 1.5K 1/8W ±1%			91637	MFF-1/8
R96		930503013	RESISTOR, FILM 301K 1/8W ±1%			91637	MFF-1/8
R97		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R98		930501002	RESISTOR, FILM 10K 1/8W ±1%			91637	MFF-1/8
R99		930501002	RESISTOR, FILM 10K 1/8W ±1%			91637	MFF-1/8
R100		930501002	RESISTOR, FILM 10K 1/8W ±1%			91637	MFF-1/8
R101		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R102		930501003	RESISTOR, FILM 100K 1/8W ±1%			91637	MFF-1/8
R103		930510499	RESISTOR, FILM 49.9 OHM 1/8W ±1%	1			
S1		971600004	SWITCH, PUSHBUTTON 3 STATION 12 P.D.T.	1		31918	3X15FSB/BLK4UGR
S2			PART OF S1				
S3			PART OF S1			TTI	P1105-004-01
S4		971600020	SWITCH, PUSHBUTTON 1 P.D.T.	1		31918	1XFFSB/BLK2U0A
S5		971600026	SWITCH, PUSHBUTTON 3 STATION 6 P.D.T.	1		31918	3XF15FSB/BLK 2UGR
S6			PART OF S5				
S7			PART OF S5				
	1	D-P1105-004-01	PRINTED CIRCUIT BOARD, REV E	1		TTI	P1105-004-01
	2	"	NOT USED				
	3	971400007	SOCKET, INT. CKT, 8 PIN DIP	1		00779	583640-1
	4	971400008	SOCKET, INT. CKT, 10 PIN ROUND	1		71785	10-ICS
	5	971400002	SOCKET, INT. CKT, 16 PIN DIP	1		71785	16 D.I.P.
	6	971200005	TERMINAL, STAKE	16		00779	86147-2

Table 6-8. Filter Circuit Board Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C1		910400002	CAPACITOR, MICA, 5PF, 500V	9		72136	DM15-050D
C2		910500030	CAPACITOR, POLYCARB .01UF, 100V, ±1%	14		IMB	BV2B103F
C3		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C4		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C5		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C6		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C7		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C8		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C9		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C10		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C11		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C12		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C13		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C14		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C15		910400002	CAPACITOR, MICA, 5PF, 500V			72136	DM15-050D
C16		910200045	CAPACITOR, TANTALEX, 10UF, 20V	2		56289	196D106X 9020JA1
C17		910200045	CAPACITOR, TANTALEX, 10UF, 20V			56289	196D106X 9020JA1
C18			NOT USED				
C19		910100001	CAPACITOR, DISK, .0022UF, 1KV	2		71590	DD222
C20		910100017	CAPACITOR, DISK, 100PF, 1KV	2		71590	DD101
C21		910100001	CAPACITOR, DISK, .0022 UF, 1KV			71590	DD222
C22		910100017	CAPACITOR, DISK, 100PF, 1KV			71590	DD101
C23		910200060	CAPACITOR, TANTALEX, .47UF, 35V	2		56289	196D474X 0035MA1
C24		910200060	CAPACITOR, TANTALEX, .47UF, 35V			56289	196D474X 0035MA1
C25		910100004	CAPACITOR, DISK, .05UF, 25V	14		71590	UK25-503
C26		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C27		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C28		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C29		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C30		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C31		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C32		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C33		910500030	CAPACITOR, POLYCARB, .01UF, 100V, ±1%			IMB	BV2B103F
C34		910100004	CAPACITOR, DISK .05UF, 25V			71590	UK25-503
C35		910100004	CAPACITOR, DISK .05UF, 25V			71590	UK25-503
C36		910100004	CAPACITOR, DISK .05UF, 25V			71590	UK25-503
C37		910100004	CAPACITOR, DISK .05UF, 25V			71590	UK25-503
C38		910100004	CAPACITOR, DISK .05UF, 25V			71590	UK25-503
C39		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C40		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C41		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C42		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C43		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C44		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C45		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503
C46		910100004	CAPACITOR, DISK, 0.05UF, 25V			71590	UK25-503

Table 6-8. Filter Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
CR1		940200032	DIODE, IN4148	2		03508	1N4148
CR2		940200032	DIODE, IN4148			03508	1N4148
FL1		C-P1105-015-01	ASSEMBLY, 3 KHZ FLAT FILTER	AR	5	TTI	P1105-015-01
FL1		C-P1105-019-01	ASSEMBLY, 15 KHZ FLAT FILTER	AR	5	TTI	P1105-019-01
FL1		C-P1105-022-01	ASSEMBLY, 50 K BIT DATA FILTER	AR	5	TTI	P1105-022-01
FL1		C-P1105-024-01	ASSEMBLY, PROGRAM FILTER	AR	5	TTI	P1105-024-01
FL2		C-P1105-015-01	ASSEMBLY, 3 kHz FLAT FILTER	AR	5	TTI	P1105-015-01
FL2		C-P1105-019-01	ASSEMBLY, 15 kHz FLAT FILTER	AR	5	TTI	P1105-019-01
FL2		C-P1105-022-01	ASSEMBLY, 50 K DATA BIT FILTER	AR	5	TTI	P1105-022-01
FL2		C-P1105-024-01	ASSEMBLY, PROGRAM FILTER	AR	5	TTI	P1105-024-01
IC1		952000017	INT CKT, OP-AMP, SN72748P	9		01295	SN72748P
IC2		952000017	INT CKT, OP-AMP, SN72748P			01295	SN72748P
IC3		952000017	INT CKT, OP-AMP, SN72748P			01295	SN72748P
IC4		952000011	INT. CKT. OP-AMP, 741CN	7		27014	741CN
IC5		952000017	INT. CKT, OP-AMP, SN72748P			01295	SN72748P
IC6		952000017	INT. CKT, OP-AMP, SN72748P			01295	SN72748P
IC7		952000017	INT. CKT, OP-AMP, SN72748P			01295	SN72748P
IC8		952000011	INT. CKT, OP-AMP, 741CN			27014	741CN
IC9		952000017	INT. CKT, OP-AMP, SN72748P			01295	SN72748P
IC10		952000017	INT. CKT, OP-AMP, SN72748P			01295	SN72748P
IC11		952000017	INT. CKT, OP-AMP, SN72748P			01295	SN72748P
IC12		952000011	INT. CKT, OP-AMP, 741CN			27014	741CN
IC13		952000011	INT. CKT, OP-AMP, 741CN			27014	741CN
IC14		952000011	INT. CKT, OP-AMP, 741CN			27014	741CN
IC15		952000011	INT. CKT, OP-AMP, 741CN			27014	741CN
IC16		952000011	INT, CKT, OP-AMP, 741CN			27014	741CN
IC17		952000014	INT. CKT, OP-AMP, LM709HM	2		27014	LM709HM
IC18		952000014	INT, CKT, OP-AMP, LM709HM			27014	LM709HM

Table 6-8. Filter Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
K1		971300004	RELAY, REED, 2 - FORM C	1		18542	832-453
K2		971300006	RELAY, REED, 1 -FORM C	1		31951	101-001-12
L1		970700014	CHOKE, 470 UH	2		72259	WEE-470
L2		970700014	CHOKE, 470 UH			72259	WEE-470
Q1		960100005	TRANSISTOR, NPN, 2N5133	1		07263	2N5133
Q2		960100012	TRANSISTOR, PNP, 2N5139	2		07263	2N5139
Q3		960100012	TRANSISTOR, PNP, 2N5139			07263	2N5139
R1		930200047	RESISTOR, METAL FILM, 193.5K, 1/4W, ±0.1 %	4		14298	REA-¼ 50PPM
R2		930200047	RESISTOR, METAL FILM, 193.5K, 1/4W, ±0.1 %			14298	REA-¼ 50PPM
R3		930501302	RESISTOR, METAL FILM, 13K, 1/8W, ±1%	2		91637	MFF-1/8
R4		930200028	RESISTOR, METAL FILM, 14.023K, 1/4W, ±0.1 %	1		14298	REA-¼ 50PPM
R5		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %	15		14298	REA-1/4 50 PPM
R6		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R7		920200202	RESISTOR, VARIABLE, 2K	3		02111	43P202
R8		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R9		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R10		930200037	RESISTOR, METAL FILM, 3.241K, 1/4W, ±0.1 %	1		14298	REA-1/4 50 PPM
R11		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R12		930200038	RESISTOR, METAL FILM, 33.234K, 1/4W, ±0.1 %	2		14298	REA-1/4 50 PPM
R13		930200038	RESISTOR, METAL FILM, 33.234K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R14		930501402	RESISTOR, METAL FILM, 14K, 1/8W, ±1%	2		91637	MFF-1/8
R15		930200040	RESISTOR, METAL FILM, 15.478K, 1/4W, ±0.1 %	1		14298	REA-1/4 50 PPM
R16		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R17		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R18		920200202	RESISTOR, VARIABLE, 2K			02111	43P202
R19		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R20		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R21		930200043	RESISTOR, METAL FILM, 85.888K, 1/4W, ±0.1 %	1		14298	REA-1/4 50 PPM
R22		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R23		930200047	RESISTOR, METAL FILM, 193.5K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R24		930200047	RESISTOR, METAL FILM, 193.5K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R25		930501652	RESISTOR, METAL FILM, 16.5K, 1/8W, ±1%	1		91637	MFF-1/8
R26		930200044	RESISTOR, METAL FILM, 18.361K, 1/4W, ±0.1 %	1		14298	REA-1/4 50 PPM
R27		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R28		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R29		920200202	RESISTOR, VARIABLE, 2K,			02111	43P202
R30		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R31		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R32		930200048	RESISTOR, METAL FILM, 2.867K, 1/4W, ±0.1 %	1		14298	REA 1/4

Table 6-8. Filter Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R33		930200006	RESISTOR, METAL FILM, 10K, 1/4W, ±0.1 %			14298	REA-1/4 50 PPM
R34		930503482	RESISTOR, METAL FILM, 34.8K, 1/8W, ± 1%	1		91637	MFF-1/8
R35		930501001	RESISTOR, METAL FILM, 1K, 1/8W, ± 1%	1		91637	MFF-1/8
R36		930502001	RESISTOR, METAL FILM, 2K, 1/8W, ± 1%	2		91637	MFF-1/8
R37		930501003	RESISTOR, METAL FILM, 100K, 1/8W, ± 1%	1		91637	MFF-1/8
R38		930200068	RESISTOR, METAL FILM, 100K, 1/4W, ±0.1 %	1		14298	REA-1/4 50 PPM
R39		930200001	RESISTOR, METAL FILM, 1K, 1/4W, ±0.1 %	1		14298	REA-1/4 50 PPM
R40		930501332	RESISTOR, METAL FILM, 13.3K, 1/8W, ± 1%	1		91637	MFF-1/8
R41		930501501	RESISTOR, METAL FILM, 1.5K, 1/8W, ± 1%	2		91637	MFF-1/8
R42		930502872	RESISTOR, METAL FILM, 28.7K, 1/8W, ±1%	1		91637	MFF-1/8
R43		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%	8		91637	MFF-1/8
R44		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
R45		930501501	RESISTOR, METAL FILM, 1.5K, 1/8W, ±1%			91637	MFF-1/8
R46		930508252	RESISTOR, METAL FILM, 82.5K, 1/8W, ±1%	1		91637	MFF-1/8
R47		930501402	RESISTOR, METAL FILM, 14K, 1/8W, ±1%			91637	MFF-1/8
R48		930502001	RESISTOR, METAL FILM, 2K, 1/8W, ±1%			91637	MFF-1/8
R49		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
R50		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
R51		930501371	RESISTOR, METAL FILM, 1.37K, 1/8W, ±1%	1		91637	MFF-1/8
R52		930504992	RESISTOR, METAL FILM, 49.9K, 1/8W, ±1%	1		91637	MFF-1/8
R53		930504990	RESISTOR, METAL FILM, 499, 1/8W, ±1%	1		91637	MFF-1/8
R54		930504022	RESISTOR, METAL FILM, 40.2K, 1/8W, ±1%	2		91637	MFF-1/8
R55		930503162	RESISTOR, METAL FILM, 31.6K, 1/8W, ±1%	1		91637	MFF-1/8
R56		930504022	RESISTOR, METAL FILM, 40.2K, 1/8W, ±1%			91637	MFF-1/8
R57		930502152	RESISTOR, METAL FILM, 21.5K, 1/8W, ±1%	1		91637	MFF-1/8
R58		930502002	RESISTOR, METAL FILM, 20K, 1/8W, ±1%	1		91637	MFF-1/8
R59		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
R60		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
R61		930505761	RESISTOR, METAL FILM, 5.76K, 1/8W, ±1%	1		91637	MFF-1/8
R62		930501302	RESISTOR, METAL FILM, 13K, 1/8W, ±1%			91637	MFF-1/8
R63		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
R64		920100203	RESISTOR, VARIABLE, 20K	1		73138	72PX
R65		930501002	RESISTOR, METAL FILM, 10K, 1/8W, ±1%			91637	MFF-1/8
S1		971600020	SWITCH, PUSHBUTTON, DPDT (MOMENTARY)	2		31918	1XFFSB/BLK2U0A
S2,3,4		971600026	SWITCH, PUSHBUTTON, 3 STATION,	1		31918	3XF15FSB/BLK 2UGR
S5		971600020	SWITCH, PUSHBUTTON, DPDT (MOMENTARY)			31918	1XFFSB/BLK2U0A
T1		971900024	TRANSFORMER, AUDIO (A-B0001-042-01)	1		TTI	B0001-042-01

Table 6-8. Filter Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
	1	D-P1105-010-01	PRINTED CIRCUIT BOARD, REV C	1		TTI	P1105-010-01
	2	971400007	SOCKET, 8 PIN DIP	3		00779	583640-1
	3	971400006	SOCKET, 8 PIN ROUND	1		91785	8ICS
	4	971200005	TERMINAL, STAKE	18		00779	86147-2
	5	A-B0001-047-01	SHIELD, TRANSFORMER	1		TTI	B0001-047-01

Table 6-9. Oscillator Circuit Board Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C1		910100004	CAPACITOR, DISK .05UF 25V	14		71590	UK25-503
C2			SAME AS C1				
C3		910400028	CAPACITOR, SILVER MICA .0039 UF 500V ±5%	1		72136	DM19-392J
C4			NOT USED				
C5			NOT USED				
C6			NOT USED				
C7		910400011	CAPACITOR, SILVER MICA 220PF 500V ±5%	1		72136	DM15-221J
C8		910200053	CAPACITOR, ELECTROLYTIC 15UF 20V	4		56289	196D156X 9020KA1
C9		910100015	CAPACITOR, DISK 20PF 1KV	1		71590	DD200
C10			SAME AS C1				
C11			SAME AS C1				
C12			SAME AS C8				
C13			SAME AS C1				
C14			SAME AS C1				
C15		910100027	CAPACITOR, DISK .001UF 1KV ±10%	4		71590	DD102
C16		910500023	CAPACITOR, MYLAR .002UF 100V ±1%	4		IMB	BA2B202F
C17			SAME AS C16				
C18			SAME AS C16				
C19			SAME AS C16				
C20			SAME AS C1				
C21			SAME AS C1				
C22		910200053	CAPACITOR, ELECTROLYTIC 15UF 20V			56289	196D156X 902KA1
C23			SAME AS C22				
C24			SAME AS C1				
C25		910100020	CAPACITOR, DISK 500 PF 1KV	1		71590	DD501
C26		910100001	CAPACITOR, DISK .0022UF 1KV	2		71590	DD222
C27			SAME AS C1				
C28			SAME AS C15				
C29		910400003	CAPACITOR, SILVER 10PF 500V ±5%	1		72136	DM15-100J
C30			NOT USED				
C31			NOT USED				
C32			NOT USED				
C33		910200045	CAPACITOR, ELECTROLYTIC 10UF 20V	2		56289	196D106X 9020JA1
C34			NOT USED				
C35			NOT USED				
C36			SAME AS C33				
C37			NOT USED				
C38			NOT USED				
C40		910400022	CAPACITOR, SILVER MICA, 500PF 500V	2		72136	DM15-501J
C41		910100027	CAPACITOR, CERAMIC DISK, .001UF 10% 1KV			71590	DD102
C42		910400005	CAPACITOR, SILVER MICA, 100PF 500V	1		72136	DM15-101J
C43		910400004	CAPACITOR, SILVER MICA, 33PF, 500V	1		72136	DM15-330J
C44		910200051	CAPACITOR, ELECTROLYTIC, 220UF, 10V	1		56289	196D227X9004LA3
C45		910100001	CAPACITOR, CERAMIC DISK, .0022UF, 1KV			71590	DD222
C46		910100027	CAPACITOR, CERAMIC DISK, .001UF, 10% 1KV			71590	DD102
C47		910400022	CAPACITOR, SILVER MICA, 500PF 500V			72136	DM15-501J

Table 6-9. Oscillator Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C48		910200009	CAPACITOR, ELECTROLYTIC, 35UF 6V	1		29309	JA-3-35-6-8N
C49		910200073	CAPACITOR, ELECTROLYTIC, 47UF 100V	2	5		100T47
C50		910200073	CAPACITOR, ELECTROLYTIC, 47UF 100V		5		100T47
C51		910100004	CAPACITOR, CERAMIC DISK, .05UF 25V			71590	UK25-503
C52		910100004	CAPACITOR, CERAMIC DISK, .05UF 25V			71590	UK25-503
C53		910100004	CAPACITOR, CERAMIC DISK, .05UF 25V			71590	UK25-503
C54		910100004	CAPACITOR, CERAMIC DISK, .05UF 25V			71590	UK25-503
C55		910100018	CAPACITOR, CERAMIC DISK, 200PF, 1KV	1		71590	DD201
C39			NOT USED				
CR1		940200017	DIODE IN4736A	3		12969	IN4736A
CR2			NOT USED				
CR3			NOT USED				
CR4			NOT USED				
CR5		940200032	DIODE IN4148	4		03508	IN4148
CR6			SAME AS CR5				
CR7			SAME AS CR5				
CR8		940200017	DIODE IN4736			12969	IN4736
CR9		940200017	DIODE IN4736			12969	IN4736
CR10		940200032	DIODE, IN4148			03508	IN4148
IC1		952000011	INT CKT, OP AMP 741CN	1		27014	741CN
IC2		952000015	INT CKT, OP AMP SN72747N	1		01295	SN72747N
IC3		950300001	INT CKT, DIODE SP301A	1		18324	SP301A
IC4		952000165	INT CKT, OP AMP HA-911	1		34371	HA-911
IC5		952000016	INT CKT, DIFFERENTIAL COMPARATOR uA710C	1		07263	710C
IC6		952000155	INT CKT, OP AMP RC4558	1		49956	RC4558
IC7		952000003	INT CKT, OP AMP u715AC	3		07263	U5F7715393
IC8		952000017	INT CKT, OP AMP SN72748P	1		01295	SN72748P
IC9			SAME AS IC7				
IC10			SAME AS IC7				
K1		971300002	RELAY, REED 12V FORM A	3		31951	203-100-12
K2			SAME AS K1				
K3			SAME AS K1				
L1		970700014	INDUCTOR 470UH	2		72259	WEE-470
L2			SAME AS L1				

Table 6-9. Oscillator Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
Q1		962000005	TRANSISTOR 2N5134	3		07263	2N5134
Q2		960100012	TRANSISTOR 2N5139	3		07263	2N5139
Q3			SAME AS Q2				
Q4			NOT USED				
Q5		960100021	TRANSISTOR 2N4249	1		07263	2N4249
Q6			SAME AS Q1				
Q7		960100007	TRANSISTOR 2N5210	1		04713	2N5210
Q8			SAME AS Q2				
Q9		960100008	TRANSISTOR 2N4062	11		01295	2N4062
Q10		960100002	TRANSISTOR 2N3711	11		01295	2N3711
Q11		960100008	TRANSISTOR 2N4062			01295	2N4062
Q12		960100002	TRANSISTOR 2N3711			01295	2N3711
Q13		960100008	TRANSISTOR 2N4062			01295	2N4062
Q14		960100002	TRANSISTOR 2N3711			01295	2N3711
Q15		960100008	TRANSISTOR 2N4062			01295	2N4062
Q16		960100008	TRANSISTOR 2N4062			01295	2N4062
Q17		960100002	TRANSISTOR 2N3711			01295	2N3711
Q18		960100008	TRANSISTOR 2N4062			01295	2N4062
Q19		960100002	TRANSISTOR 2N3711			01295	2N3711
Q20		960100002	TRANSISTOR 2N3711			01295	2N3711
Q21		960100008	TRANSISTOR 2N4062			01295	2N4062
Q22		960100002	TRANSISTOR 2N3711			01295	2N3711
Q23		960100008	TRANSISTOR, 2N4062			01295	2N4062
Q24		960100002	TRANSISTOR, 2N3711			01295	2N3711
Q25		960100008	TRANSISTOR, 2N4062			01295	2N4062
Q26		960100002	TRANSISTOR, 2N3711			01295	2N3711
Q27		960100002	TRANSISTOR, 2N3711			01295	2N3711
Q28		960100008	TRANSISTOR, 2N4062			01295	2N4062
Q29		960100002	TRANSISTOR, 2N3711			01295	2N3711
Q30		960100008	TRANSISTOR, 2N4062			01295	2N4062
Q31			NOT USED				
Q32			NOT USED				
Q33			NOT USED				
Q34			NOT USED				
Q35			NOT USED				
Q36			NOT USED				
Q37			NOT USED				
Q38			NOT USED				
Q39			NOT USED				
Q40			NOT USED				
Q41			NOT USED				
Q42			NOT USED				
Q43			SAME AS Q1				

Table 6-9. Oscillator Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R1		930505230	RESISTOR, FILM 523 OHMS ±1% 1/8W	1		91637	MFF-1/8
R2		930502002	RESISTOR, FILM 20.0K ±1% 1/8W	4		91637	MFF-1/8
R3		930200006	RESISTOR, FILM 10.00K ±.1% 1/4W	2		14298	REA-1/4 50 PPM
R4			SAME AS R3				
R5		930504991	RESISTOR, FILM 4.99K ±1% 1/8W	1		91637	MFF-1/8
R6		920200103	RESISTOR, VARIABLE 10K	1		02111	43P103
R7		930502801	RESISTOR, FILM 2.80K ±1% 1/8W	1		91637	MFF-1/8
R8		930501401	RESISTOR, FILM 1.40K ±1% 1/8W	1		91637	MFF-1/8
R9		930200015	RESISTOR, FILM 40.00K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R10		930502742	RESISTOR, FILM 27.4K ±1% 1/8W	1		91637	MFF-1/8
R11		930200008	RESISTOR, FILM 20.00K ±.1% 1/4W	5		14298	REA-1/4 50PPM
R12		930700103	RESISTOR, COMP. 10K ±5% 1/4W	3		01121	JANRCR07
R13		930700272	RESISTOR, COMP. 2.7K ±5% 1/4W	3		01121	JANRCR07
R14		930700102	RESISTOR, COMP. 1K ±5% 1/4W	2		01121	JANRCR07
R15			SAME AS R12				
R16		930507151	RESISTOR, FILM 7.15K ±1% 1/8W	2		91637	MFF-1/8
R17			SAME AS R13				
R18		930503241	RESISTOR, FILM 3.24K ±1% 1/8W	2		91637	MFF-1/8
R19			SAME AS R18				
R20		930700361	RESISTOR, COMP. 360 OHMS ±5% 1/4W	1		01121	JANRCR07
R21		930501501	RESISTOR, FILM 1.50K ±1% 1/8W	1		91637	MFF-1/8
R22		920200202	RESISTOR, VARIABLE 2K	1		02111	43P202
R23			SAME AS R16				
R24		920200102	RESISTOR, VARIABLE 1K	1		02111	43P102
R25		930700472	RESISTOR, COMP. 4.7K ±5% 1/4W	1		01121	JANRCR07
R26			SAME AS R12				
R27			SAME AS R13				
R28			SAME AS R14				
R29		930700123	RESISTOR, COMP. 12K ±5% 1/4W	1		01121	JANRCR07
R30		930501001	RESISTOR, FILM 1.00K ±1% 1/8W	1		91637	MFF-1/8
R31		930506340	RESISTOR, FILM 634 OHMS ±1% 1/8W	2		91637	MFF-1/8
R32		930503400	RESISTOR, FILM 340 OHMS ±1% 1/8W	2		91637	MFF-1/8
R33		930501540	RESISTOR, FILM 154 OHMS ±1% 1/8W	2		91637	MFF-1/8
R34		930508061	RESISTOR, FILM 8.06K ±1% 1/8W	2		91637	MFF-1/8
R35		930501502	RESISTOR, FILM 15.0K ±1% 1/8W	6		91637	MFF-1/8
R36			SAME AS R35				
R37			SAME AS R35				
R38		930503242	RESISTOR, FILM 32.4K ±1% 1/8W	2		91637	MFF-1/8
R39		930503011	RESISTOR, FILM 3.01K ±1% 1/8W	4		91637	MFF-1/8
R40		930700391	RESISTOR, COMP. 390 OHMS 5% 1/4W	2		01121	JANRCR07
R41			SAME AS R2				
R42		930501821	RESISTOR, FILM 1.82K ±1% 1/8W	2		91637	MFF-1/8
R43			SAME AS R39				
R44		930501331	RESISTOR, FILM 1.33K ±1% 1/8W	2		91637	MFF-1/8
R45		930504320	RESISTOR, FILM 432 OHMS ±1% 1/8W	2		91637	MFF-1/8
R46		930501741	RESISTOR, FILM 1.74K ±1% 1/8W	1		91637	MFF-1/8

Table 6-9. Oscillator Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R47			SAME AS R39				
R48			SAME AS R44				
R49			SAME AS R45				
R50			SAME AS R42				
R51			SAME AS R2				
R52			SAME AS R35				
R53			SAME AS R35				
R54			SAME AS R35				
R55			SAME AS R38				
R56			SAME AS R39				
R57			SAME AS R40				
R58			SAME AS R31				
R59			SAME AS R32				
R60			SAME AS R33				
R61		920200201	RESISTOR, VARIABLE 200 OHMS	1		02111	43P201
R62			SAME AS R34				
R63		930700181	RESISTOR, COMP, 180 OHMS 1/4W 5%	1		01121	JANRCR07
R64		930502551	RESISTOR, FILM, 2.55K ±1% 1/8W	1		91637	MFF-1/8
R65		930501400	RESISTOR, FILM 140 OHMS ±1% 1/8W	1		91637	MFF-1/8
R66		930200083	RESISTOR, FILM 34.11K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R67		930200087	RESISTOR, FILM 8.580K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R68			SAME AS R11				
R69			SAME AS R11				
R70		930200093	RESISTOR, FILM 56.79K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R71		930200090	RESISTOR, FILM 18.924K ±.1% 1/4W	1		14298	REA-1/4W 50PPM
R72		930200094	RESISTOR, FILM 39.42K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R73			SAME AS R11				
R74			SAME AS R11				
R75		930501002	RESISTOR, FILM 10.0K 1% 1/8W	1		91637	MFF-1/8
R76		930200074	RESISTOR, FILM 3.010K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R77		930200	RESISTOR, FILM 10.7K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R78		930200077	RESISTOR, FILM 16.60K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R79		930200079	RESISTOR, FILM 41.84K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R80		930200080	RESISTOR, FILM 6.190K ±.1% 1/4W	1		14298	REA-1/4 50PPM
R81		930200076	RESISTOR, FILM 742.2 OHMS ±.1% 1/4W	1		14298	REA-1/4 50PPM
R82		930200081	RESISTOR, FILM 909.0 OHMS ±.1% 1/4W	1		14298	REA-1/4 50PPM
R83		930200078	RESISTOR, FILM 1916 OHMS ±.1% 1/4W	1		14298	REA-1/4 50PPM
R84			NOT USED				
R85			NOT USED				
R86			NOT USED				
R87			NOT USED				
R88			NOT USED				
R89			NOT USED				
R90			NOT USED				
R91			NOT USED				
R92			NOT USED				

Table 6-9. Oscillator Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R93			NOT USED				
R94			NOT USED				
R95			NOT USED				
R96			NOT USED				
R97			NOT USED				
R98			NOT USED				
R99			NOT USED				
R100			NOT USED				
R101			NOT USED				
R102			NOT USED				
R103			NOT USED				
R104			NOT USED				
R105			NOT USED				
R106		930400003	RESISTOR, FILM 135.0 OHMS ±0.1% 10W	1		12463	N-10
R107		930400001	RESISTOR, FILM 600.00HMS ±0.1% 5W	1		12463	N-5
R108		930400002	RESISTOR, COMP. 900.0 OHMS ±0.1% 5W	1		12463	N-5
R109		930501211	RESISTOR, METAL FILM, 1.21K 1/8W 1%	1		91637	MFF-1/8
R110		930502002	RESISTOR, METAL FILM, 20K, 1/8W 1%			91637	MFF-1/8
R111		93050499O	RESISTOR, METAL FILM, 499 OHM, 1/8W 1%	1		91637	MFF-1/8
R112		930501003	RESISTOR, METAL FILM, 100K, 1/8W 1%	1		91637	MFF-1/8
R113			NOT USED				
R114			NOT USED				
R115			NOT USED				
R116			NOT USED				
RT1			NOT USED				
T1		971900024	TRANSFORMER, TOROIDAL	1		TTI	SCD-B0001-042-01
	1	D-P1110-015-01	PRINTED CIRCUIT BOARD, REV G	1		TTI	D-P1110-015-01
	2	971400001	SOCKET, INT CKT, 14 PIN DIP	1		71785	14 DIP
	3						
	4						
	5	971400006	SOCKET, INT CKT, 8 PIN ROUND	1		71785	8ICS
	6	971200005	TERMINAL STAKE	40		00779	86147-2

Table 6-10. Frequency Counter Circuit Board Parts List

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
C1		910100001	CAPACITOR, DISK .002UF 1KV	1		71590	DD222
C2		910100017	CAPACITOR, DISK 100PF 1KV	1		71590	DD101
C3		910100011	CAPACITOR, DISK 3.3PF 1KV	1		71590	DD3R3
C4		910200053	CAPACITOR, ELECTROLYTIC 15UF 20V	2		56289	196D156X 9020KA1
C5			SAME AS C4				
C6		910100004	CAPACITOR, DISK .05UF 25V	4		71590	UK25-503
C7			SAME AS C6				
C8		9101000023	CAPACITOR, DISK 39PF 1KV	2		71590	DD 390
C9			SAME AS C6				
C10		910500009	CAPACITOR, MYLAR 2UF 200V	1		IMB	ZA16C205
C11		910400004	CAPACITOR, SILVER MICA 33PF 500V	1		72136	DM15-330J
C12			SAME AS C6				
C13		910200046	CAPACITOR, ELECTROLYTIC 22UF 10V	2		56289	196D226X 9010JA1
C14		910500023	CAPACITOR, MYLAR .002UF 100V	1		IMB	BA2B202F
C15		910200045	CAPACITOR, ELECTROLYTIC 10UF 20V	2		56289	196D106X 9020JA1
C16			SAME AS C15				
C17			SAME AS C13				
C18		910200075	CAPACITOR, ELECTROLYTIC 470UF 16V	2		25088	841283/470/16/ 8118
C19			SAME AS C18				
C20		910100005	CAPACITOR, DISK 0.1UF 10V	6		71590	UK10-104
C21			SAME AS C20				
C22			SAME AS C20				
C23			SAME AS C20				
C24			SAME AS C20				
C25			SAME AS C20				
C26		910100023	CAPACITOR DISK 39PF, 1KV			71590	DD390
C27		910200061	CAPACITOR, ELECTROLYTIC 4.7UF 50V	3		56289	196D475X0050KA1
C28		910200061	CAPACITOR, ELECTROLYTIC 4.7UF 50V			56289	196D475X0050KA1
C29		910200061	CAPACITOR, ELECTROLYTIC 4.7UF 50V			56289	196D475X0050KA1
CR1		940200032	DIODE, 1N4148	3		03508	1N4148
CR2			SAME AS CR1				
CR3			SAME AS CR1				
CR4		940200004	DIODE, 1N4742A	3		04713	1N4742A
CR5		940200004	DIODE, 1N4742A			04713	1N4742A
CR6		940200004	DIODE, 1N4742A			04713	1N4742A
IC1		950200010	INT CKT, DECADE COUNTER SN7490	4		01295	SN7490N
IC2			SAME AS IC1				
IC3		950200021	INT CKT, COUNTER SN7492	1		01295	SN7492N
IC4		950200002	INT CKT, QUAD NAND GATE SN7400	1		01295	SN7400N
IC5		950200006	INT CKT, TRIPLE NAND GATE SN7410N	1		01295	SN7410N
IC6		956000001	INT CKT, DISPLAY DRIVER AY-5-4007D	1		14936	AY-5-4007D
IC7			SAME AS IC1				
IC8		950200005	INT CKT, INVERTER SN7405N	1		01295	SN7405N
IC9		950200004	INT CKT, INVERTER SN7404N	1		01295	SN7404N
IC10		950200014	INT CKT, DUAL J-K FLIP-FLOP SN74107N	1		27014	SN74107N
IC11			SAME AS IC1				
IC12		950200007	INT CKT, J-K MASTER FLIP-FLOP SN7472N	1		01295	SN7472N

Table 6-10. Frequency Counter Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
IC13		950200036	INT CKT, HEX BUFFER SN7417	1		01295	SN7417
IC14		952000153	INT CKT, OP AMP LM301AN	1		27014	LM301AN
IC15		952000154	INT CKT, PHASE-FREQ. DETECTOR MC4044P	1		04713	MC4044P
IC16		952000002	INT CKT, OP AMP LM709CH	1		27014	LM709CH
IC17		952000007	INT CKT, VOLTAGE COMP LM311H	1		27014	LM311
IC1		954000009	INT CKT, DECADE COUNTER SN74L90	3	5	01295	SN74L90N
IC2		954000009	INT CKT, DECADE COUNTER SN74L90		5	01295	SN74L90N
IC4		954000001	INT CKT, QUAD NAND GATE SN74L00	1	5	01295	SN74L00
IC5		954000004	INT CKT, TRIPLE NAND GATE SN74L10	1	5	01295	SN74L10
IC9		954000003	INT CKT, INVERTER SN74L04	1	5	01295	SN74L04
IC11		954000009	INT CKT, DECADE COUNTER SN74L90		5	01295	SN74L90
IC12		954000016	INT CKT, J-K MASTER FLIP-FLOP SN74L72	1	5	01295	SN74L90N
L1		970700014	INDUCTOR 470 μH	4		72259	WEE-470
L2		970700014	INDUCTOR 470 μH			72259	WEE-470
L3		970700014	INDUCTOR 470 μH			72259	WEE-470
L4		970700014	INDUCTOR 470 μH			72259	WEE-470
Q2			SAME AS Q1				
Q3		962000002	TRANSISTOR 2N3565	1		07263	2N3565
Q4		962000008	TRANSISTOR 2N5138	1		07263	2N5138
Q5		960100004	TRANSISTOR 2N5087	1		04713	2N5087
Q6			NOT USED				
Q7		960100012	TRANSISTOR 2N5139	1		07263	2N5139
Q8		960100024	TRANSISTOR 2N4124	1		07263	2N4124
Q1		962000005	TRANSISTOR 2N5134	2		07263	2N5134
R1		930700102	RESISTOR, COMP 1.0K ¼ W ± 5%	3		01121	JANRCR07
R2		930503012	RESISTOR, FILM 30.1K 1/8 W ± 1%	1		91637	MFF-1/8
R3		930501741	RESISTOR, FILM 1.74K 1/8 W ± 1%	1		91637	MFF-1/8
R4		930501001	RESISTOR, FILM 1.00K 1/8 W ± 1%	3		91637	MFF-1/8
R5			SAME AS R4				
R6		930501501	RESISTOR, FILM 1.50K 1/8 W ± 1%	2		91637	MFF-1/8
R7		930501003	RESISTOR, FILM 100K 1/8 W ± 1%	2		91637	MFF-1/8
R8		930505621	RESISTOR, FILM 5.62K 1/8 W ± 1%	2		91637	MFF-1/8
R9		930504870	RESISTOR, FILM 487 ohms 1/8 W ± 1%	1		91637	MFF-1/8
R10			SAME AS R1				
R11		930700470	RESISTOR, COMP 47 ohms ¼ W ± 5%	2		01121	JANRCR07
R12			SAME AS R11				
R13		930700122	RESISTOR, COMP 1.2K ¼ W ± 5%	1		01121	JANRCR07
R14		930502801	RESISTOR, FILM 2.80K 1/8 W ± 1%	1		91637	MFF-1/8
R15		930501242	RESISTOR, FILM 12.4K 1/8 W ± 1%	2		91637	MFF-1/8
R16			SAME AS R4				
R17		930700272	RESISTOR, COMP. 2.7K 1/4 W 5%	2		01121	JANRCR07
R18			SAME AS R17				
R19		930700221	RESISTOR, COMP 220 ohms ¼ W ± 5%	1		01121	JANRCR07
R20			SAME AS R7				
R21			SAME AS R6				

Table 6-10. Frequency Counter Circuit Board Parts List (Cont.)

REF DES	ITEM NO.	STOCK NO.	DESCRIPTION	TOTAL QTY	NOTES	MFR CODE IDENT	MANUFACTURERS PART NUMBER
R22			SAME AS R15				
R23		930507321	RESISTOR, FILM 7.32K 1/8 W ± 1%	1		91637	MFF-1/8
R24		930700103	RESISTOR, COMP 10K ¼ W ± 5%	3		01121	JANRCR07
R25		930700562	RESISTOR, FILM 5.6K 1/4 W ± 5%	1		01121	JANRCR07
R26			SAME AS R24				
R27		930700391	RESISTOR, COMP 390 ohms ¼ W ± 5%	1		01121	JANRCR07
R28		930502670	RESISTOR, FILM 267 OHM 1/8 W ± 1%	1		91637	MFF-1/8
R29			NOT USED				
R30			SAME AS R1				
R31			SAME AS R8				
R32		930700121	RESISTOR, COMP 120 ohms ¼ W ± 5%	7		01121	JANRCR07
R33			SAME AS R32				
R34			SAME AS R32				
R35		930700181	RESISTOR, COMP 180 ohms ¼ W ± 5%	2		01121	JANRCR07
R36			SAME AS R35				
R37			SAME AS R32				
R38			SAME AS R32				
R39			SAME AS R32				
R40			SAME AS R32				
R41		930700121	RESISTOR, COMP 120 OHMS 1/4W 5%	2		01121	JANRCR07
R42		930700121	RESISTOR, COMP 120 OHMS 1/4W 5%			01121	JANRCR07
R43		930700152	RESISTOR, COMP 1.5K 1/4W 5%	1		01121	JANRCR07
R44		930700103	RESISTOR, COMP 10K 1/4W 5%			01121	JANRCR07
	1	D-P1110-013-01	PRINTED CIRCUIT BOARD REV F	1		TTI	D-P1110-013-01
	2	971400001	SOCKET, INT CKT, 14 PIN DIP	4		71785	14 D.I.P.
	3		NOT USED				
	4		NOT USED				
	5	971400007	SOCKET, INT CKT, 8 PIN DIP	1		00779	583640-1
	6	971200005	TERMINAL, STAKE	26		00779	86147-2

Table 6-11. Final Assembly, Transmission/Noise Test Set Parts List

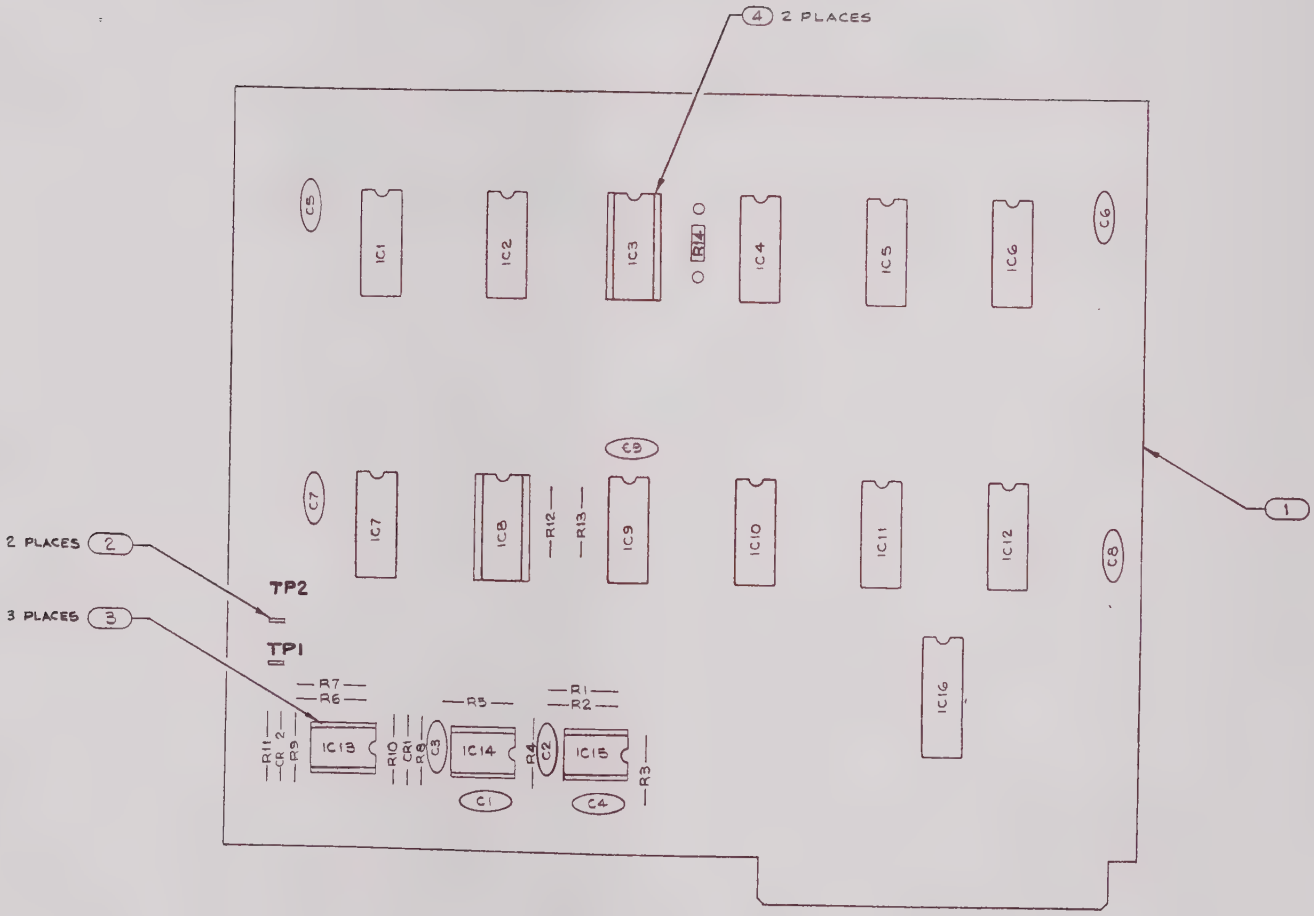
REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
	1	P1110-002-01			ASSEMBLY, OSCILLATOR & COUNTER CHASSIS	1	
	2	P1110-003-01			ASSEMBLY, FRAME AND HANDLE	1	
	3	P1110-004-01			ASSEMBLY, AC POWER SUPPLY	1	
	4	P1110-010-01			BRACKET TOP	1	
	5	P1110-021-01			CASTING REAR	1	
	6	P1110-030-01			ASSEMBLY FRONT COVER	1	
	7	P1110-031-01			ID LABEL FRONT	1	
	8	P1110-032-01			CHASSIS BOTTOM	1	
	9	P1110-033-01			BRACKET SUPPORT	1	
	10	P1100-024-18			ID LABEL REAR	1	
	11	P1100-029-07			ASSEMBLY CABLE 9 FT.	1	
	12	P1103-059-01			BRACKET MOUNTING	1	
	13	P1105-002-01			ASSEMBLY, AUTO RANGE LOGIC	1	
	14	P1110-035-01			ASSEMBLY LEVEL/NOISE CHASSIS	1	
	15	972500020			BUMPER	4	
	16	#4-40 x 1/4			SCREW BIND. HD. SST	1	
	17	#6-32 x 3/16			SCREW BIND. HD. SST	3	
	18	#6-32 x 5/16			SCREW BIND. HD. SST	16	
	19	#6-32 x 1/2			SCREW BIND. HD. SST	4	
	20	AD43BS			RIVET, POP, USM	2	
	21	#10 x 32 - 3/8			SCREW BIND. HD. SST	2	
	22	#6-32			NUT, KEP	13	
	23	#4			WASHER LOCK INT TOOTH	1	
	24	P1105-007-01			ASSEMBLY DIGITAL BOARD	1	
	25	P1105-005-01			ASSEMBLY LEVEL ANALOG BOARD	1	
	26	P1105-009-01			ASSEMBLY FILTER BOARD	1	
	27	940300003			LED RED DIFFUSED	2	
	28	972000001			JACK TELEPHONE, 3 CORD.	3	
	29	972000005			JACK TELEPHONE, 2 CORD.	1	
	30	971600012			SWITCH TOGGLE 2 PDT	5	
	31	P1105-013-02			WINDOW	1	
	32	DUBL-STIK			TAPE 2-SIDED	AR	
	33	920300004			POT CEMENT 50K	1	
	34	971600046			SWITCH ROTARY 3 P5T	1	
	35	920300001			POT 50K	1	
	36	971600037			SWITCH TOGGLE 3 POSITION 4 PDT	1	
	37	970800001			KNOB	2	
	38	970800002			KNOB	1	

Table 6-11. Final Assembly, Transmission/Noise Test Set Parts List (Cont.)

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
	39	972500048			GROMMET	3	
	40	940300007			LED	1	
	41	P1110-034-01			WINDOW OSCILLATOR	1	
	42	P1110-018-01			ASSEMBLY, DISPLAY BOARD	1	
	43	P1110-014-01			ASSEMBLY OSCILLATOR BOARD	1	
	44	P1110-012-01			ASSEMBLY FREQUENCY BOARD	1	
	45	P1110-008-01			CHASSIS PC BOARD	1	
	46	930200082			RESISTOR METAL FILM 8.158K 1/4W 0.1%	1	R3
	47	930200083			RESISTOR METAL FILM 33.4K 1/4W 0.1%	1	R4
	48	930200132			RESISTOR METAL FILM 40.2K 1/4W 0.1%	1	R5
	49	930501002			RESISTOR METAL FILM 10.0K 1/3W 1%	1	R115
	50	930506491			RESISTOR METAL FILM 5.49K 1/3W 1%	1	R116

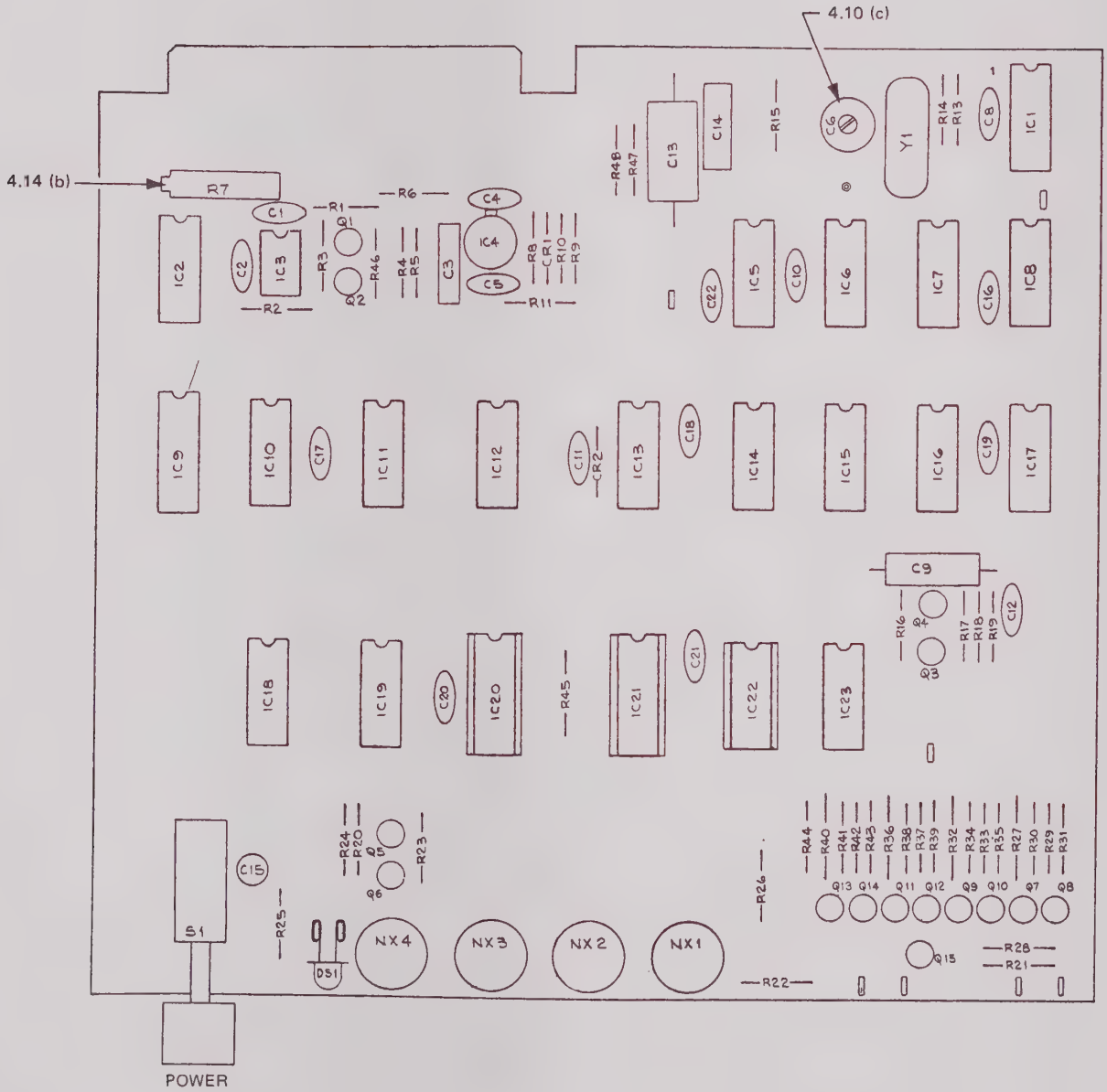
Table 6-12. 1111A Line Switch Amplifier Board Parts List

REF DES	ITEM NO.	TTI STOCK NO.	MFR CODE IDENT	MANUFACTURERS PART NUMBER	DESCRIPTION	TOTAL QTY	NOTES
C1		910200061	56289	196D475X0050KA1	CAPACITOR, ELEC. 4.7UF, 50V	1	
C2		910200075	25088	B41283/470-16/8118	CAPACITOR, ELEC. 470 UF, 16V	1	
C3		910200060	56239	196D474X0035HA1	CAPACITOR, ELEC., .47UF, 35V	1	
C4		910100006	56289	HY550	CAPACITOR, DISC, .1, 25V	1	
C5		910200078	25088	B41010/1000/40/8218	CAPACITOR, ELEC. 1000UF 40V	1	
IC1		9520000166	27014	LM380N	I.C. LM380N	1	
R1		930700753	01121	JANRCR07	RESISTOR, FIXED CARBON, 75K, 1/4W 5%	1	
R2		930700100	01121	JANRCR07	RESISTOR, FIXED CARBON, 10 OHMS,1/4W 5%	1	
R3		930400001	12463	N-5	RESISTOR, 600 OHMS, 5W, .1%	2	
R4		930400001	12463	N-5	RESISTOR, 600 OHMS, 5W, .1%	-	
R5		930700200	01121	JANRCR07	RESISTOR, 20 OHMS, 1/4W, 5%	1	
	1	P1110-050-01	TTI	D-P1110-050-01	P.C. BOARD, REV A	1	
	2	971200005	00779	86147-2	TERMINAL, STAKING, SMALL	13	



COMPONENT LAYOUT

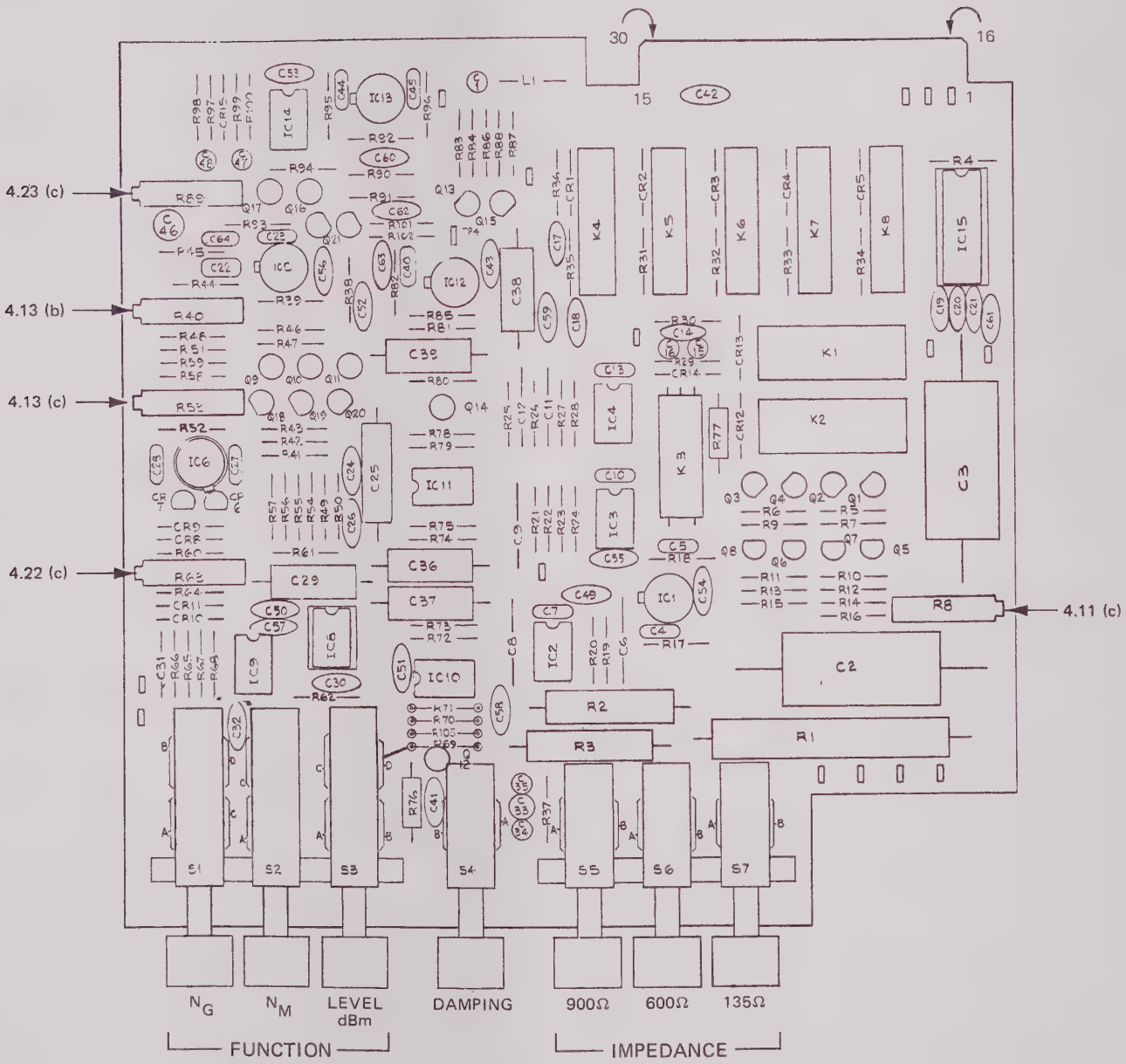
(X) Refers to Parts List item numbers.

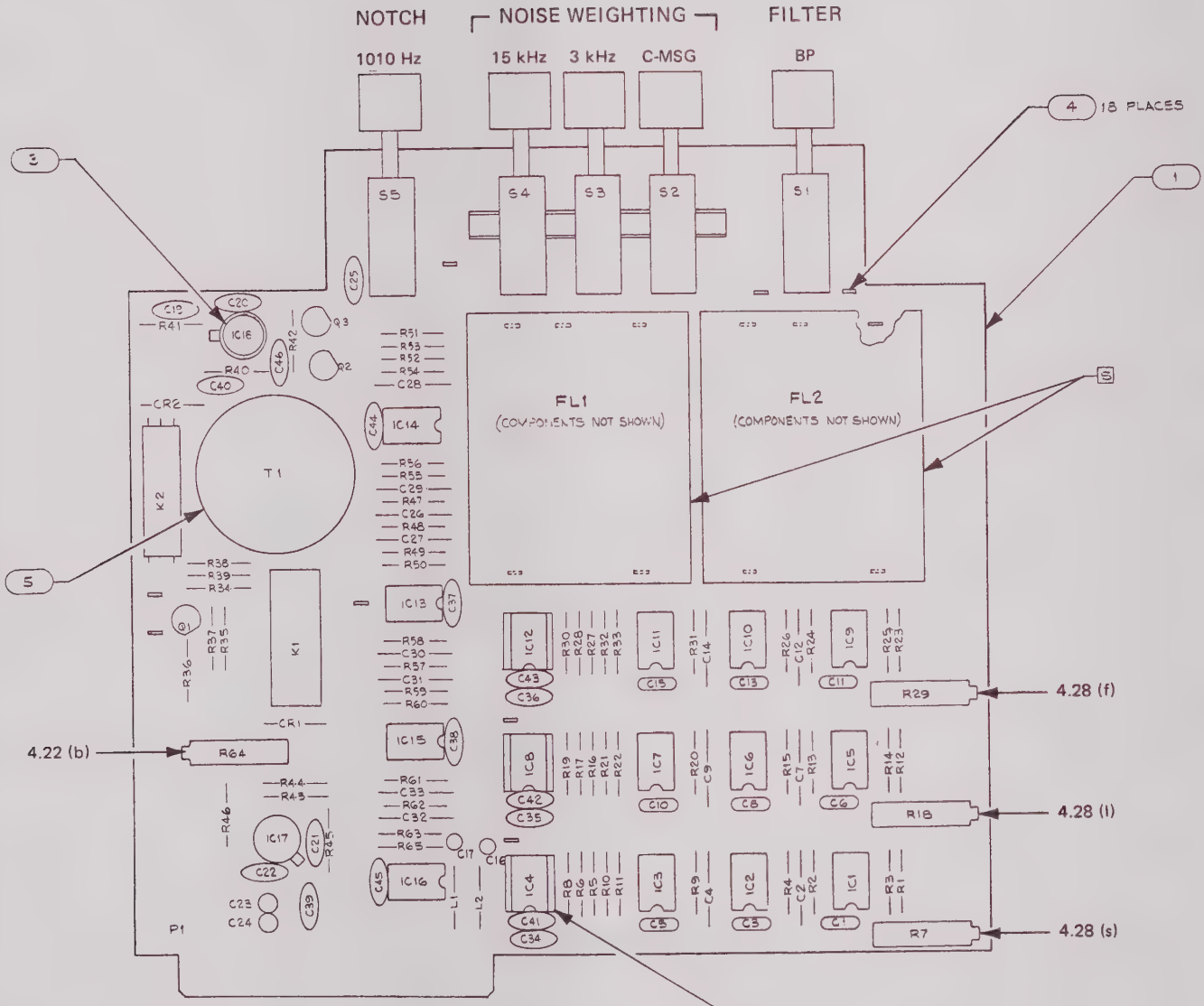


COMPONENT LAYOUT

COMPONENT LAYOUT

This board installed component side downward.

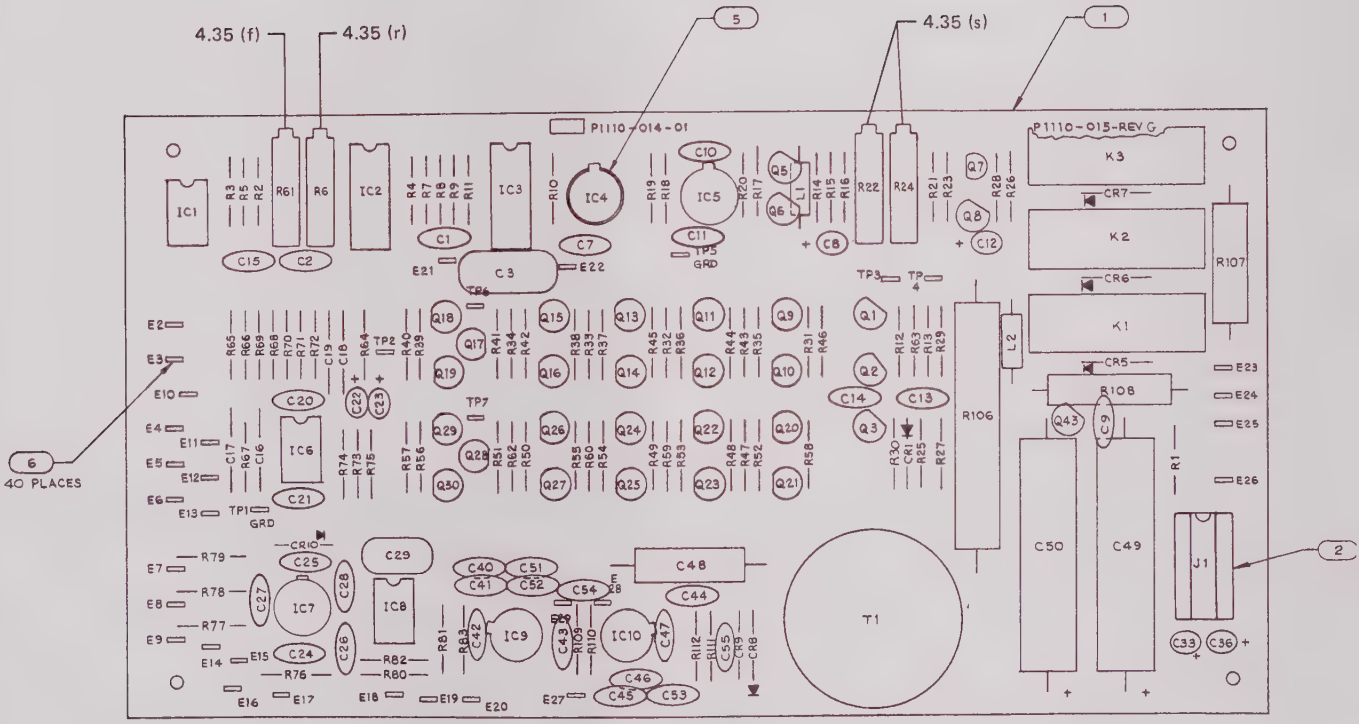




(X) Refers to Parts List item numbers.

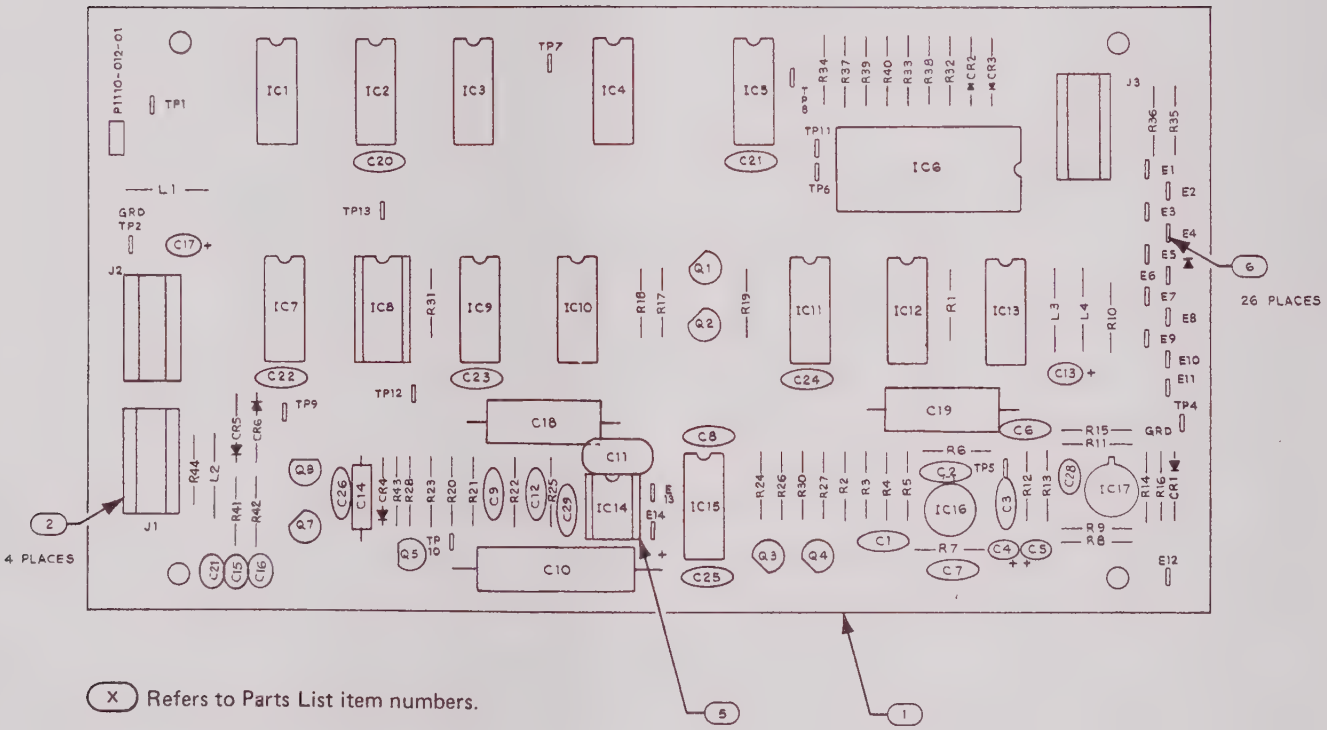
COMPONENT LAYOUT

This board installed component side down.



(X) Refers to Parts List item numbers.

COMPONENT LAYOUT

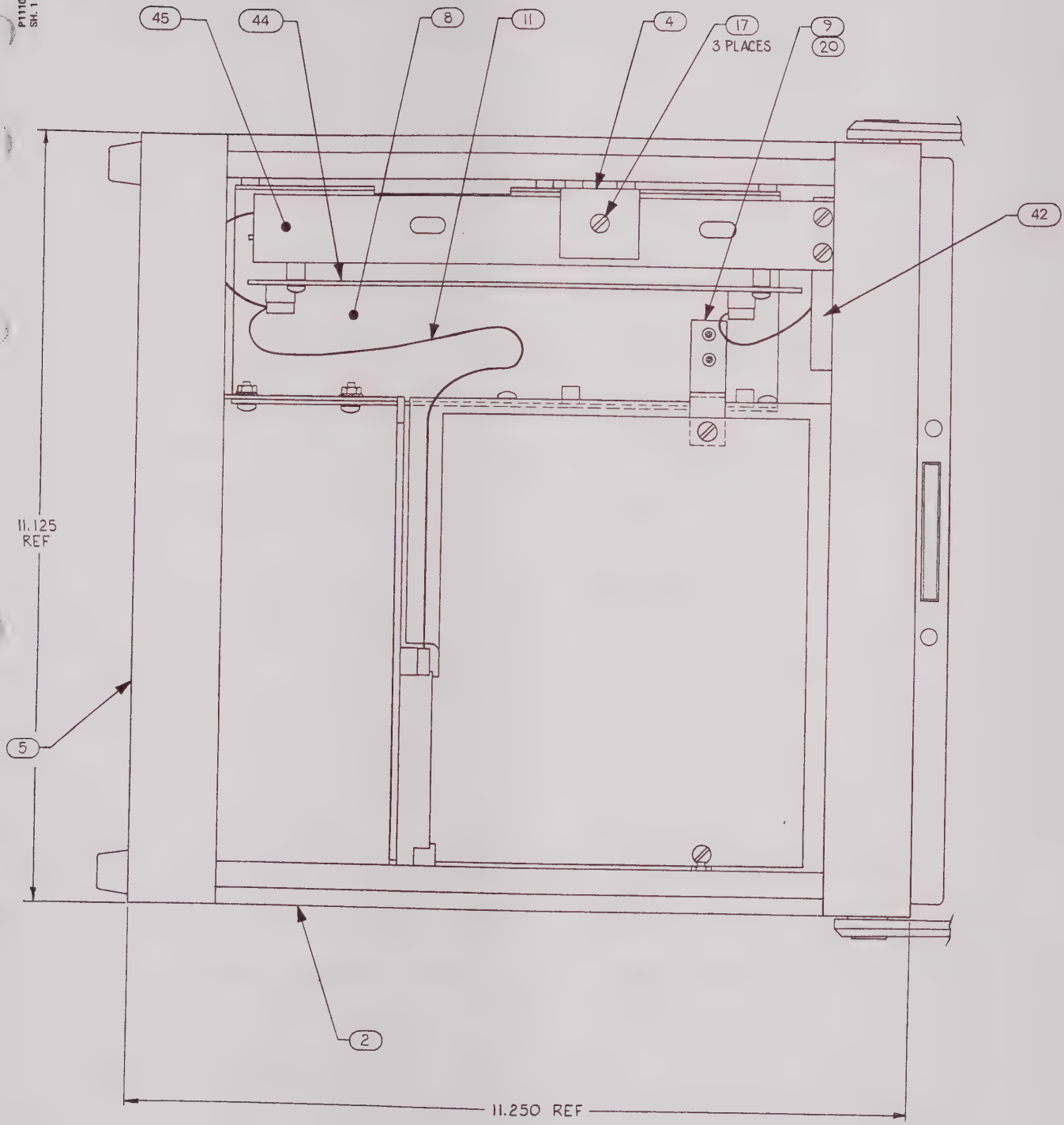


COMPONENT LAYOUT

(X) Refers to Parts List item numbers.

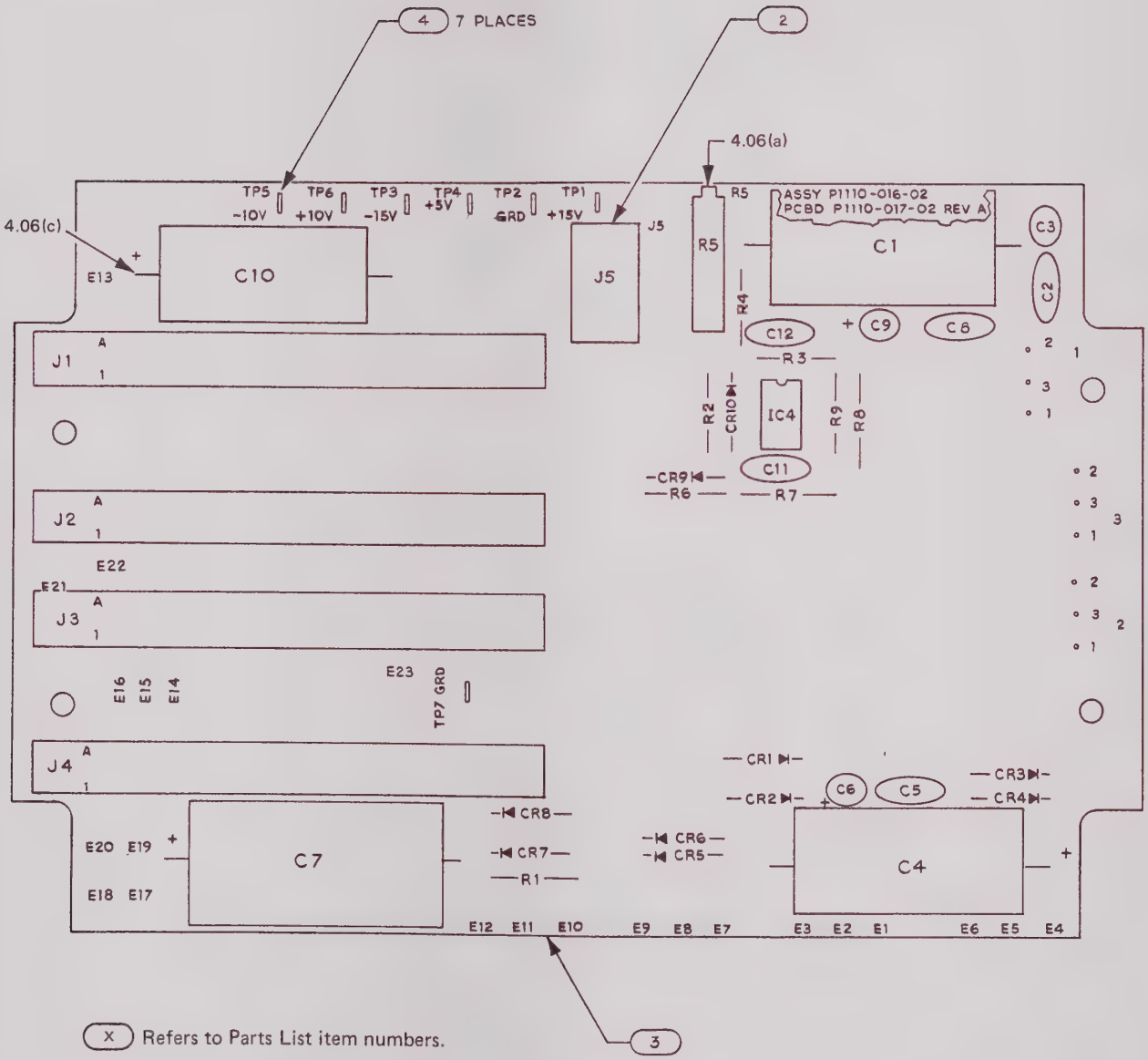
COMPONENT LAYOUT

P1110-001-01 REV. C
SH. 1 AND 2



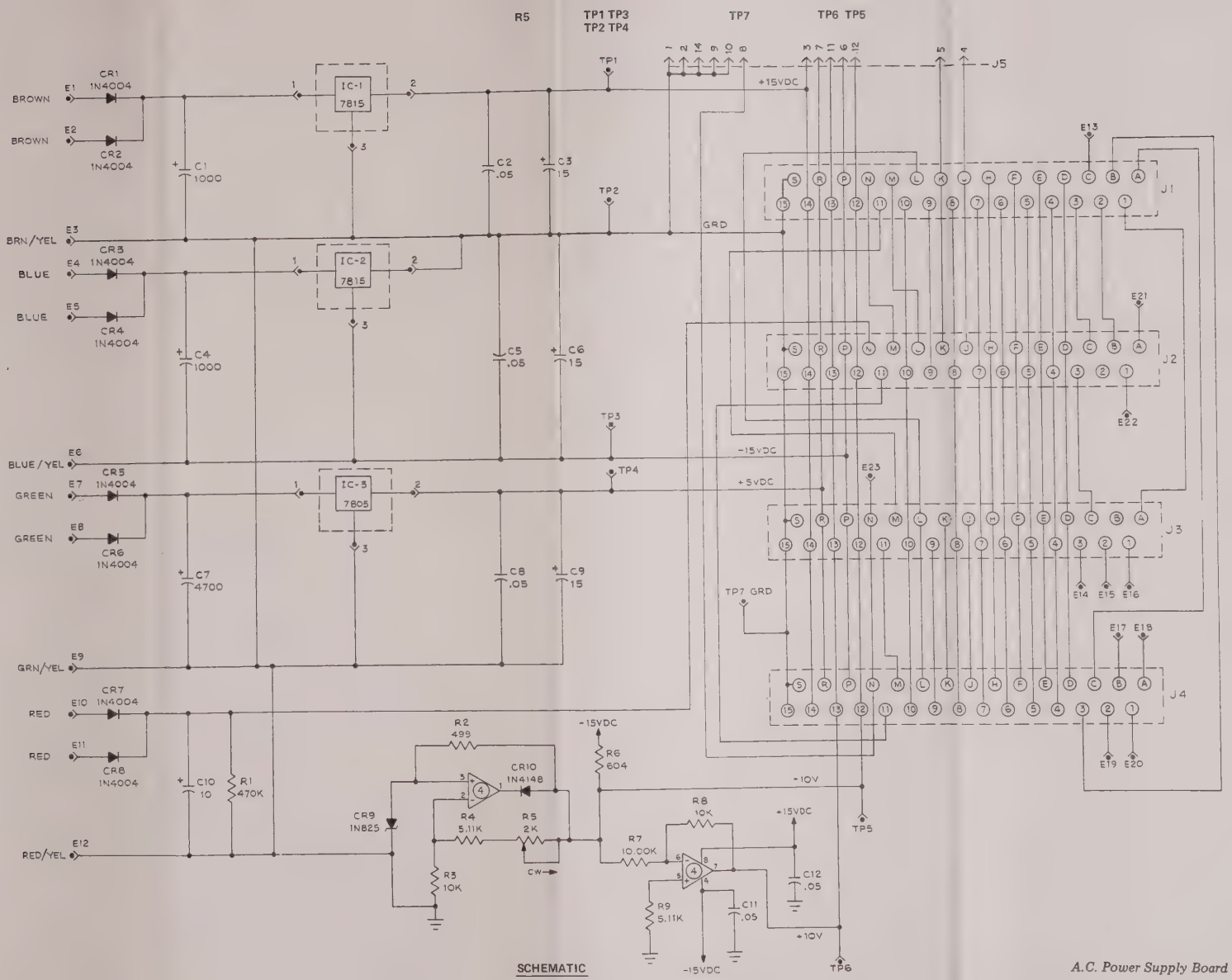
TOP VIEW

(X) Refers to Parts List item numbers.



(X) Refers to Parts List item numbers.

COMPONENT LAYOUT



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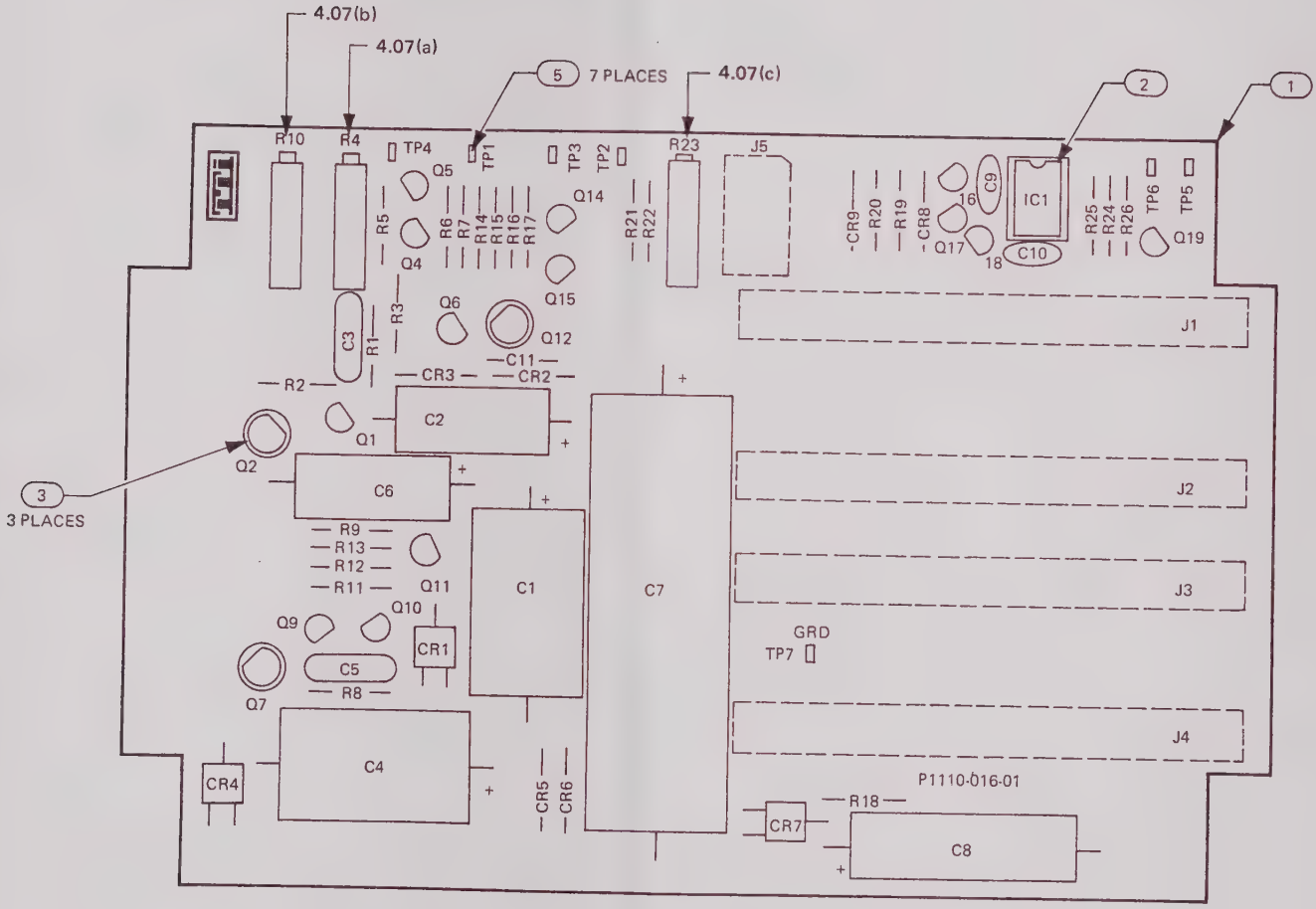
SCHEMATIC

A.C. Power Supply Board

FOLD-OUT

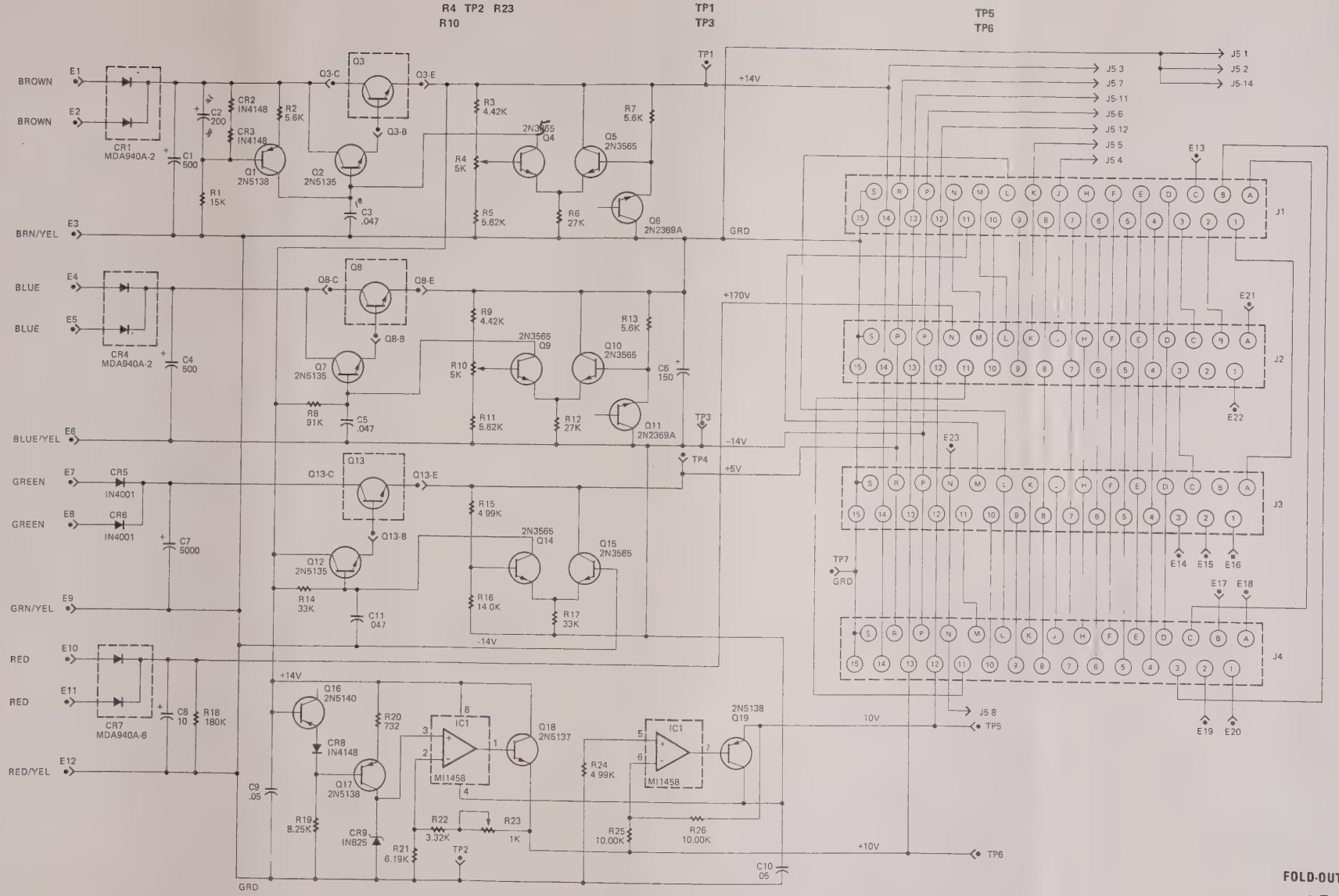
1a



(x) Refers to Parts List item numbers.

COMPONENT LAYOUT

16.

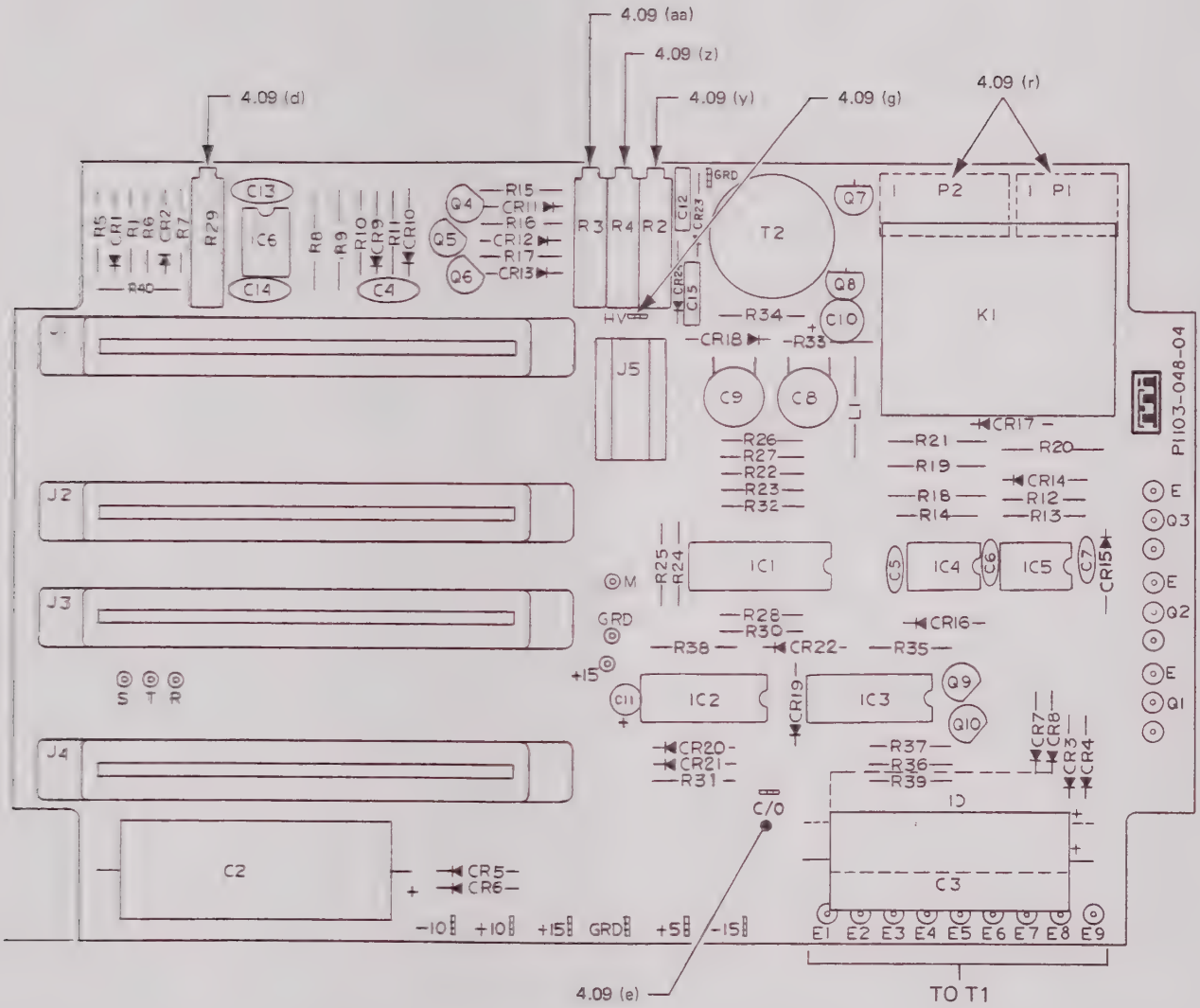


"Continued on Interconnect Drawing Fold-out #12"

SCHEMATIC

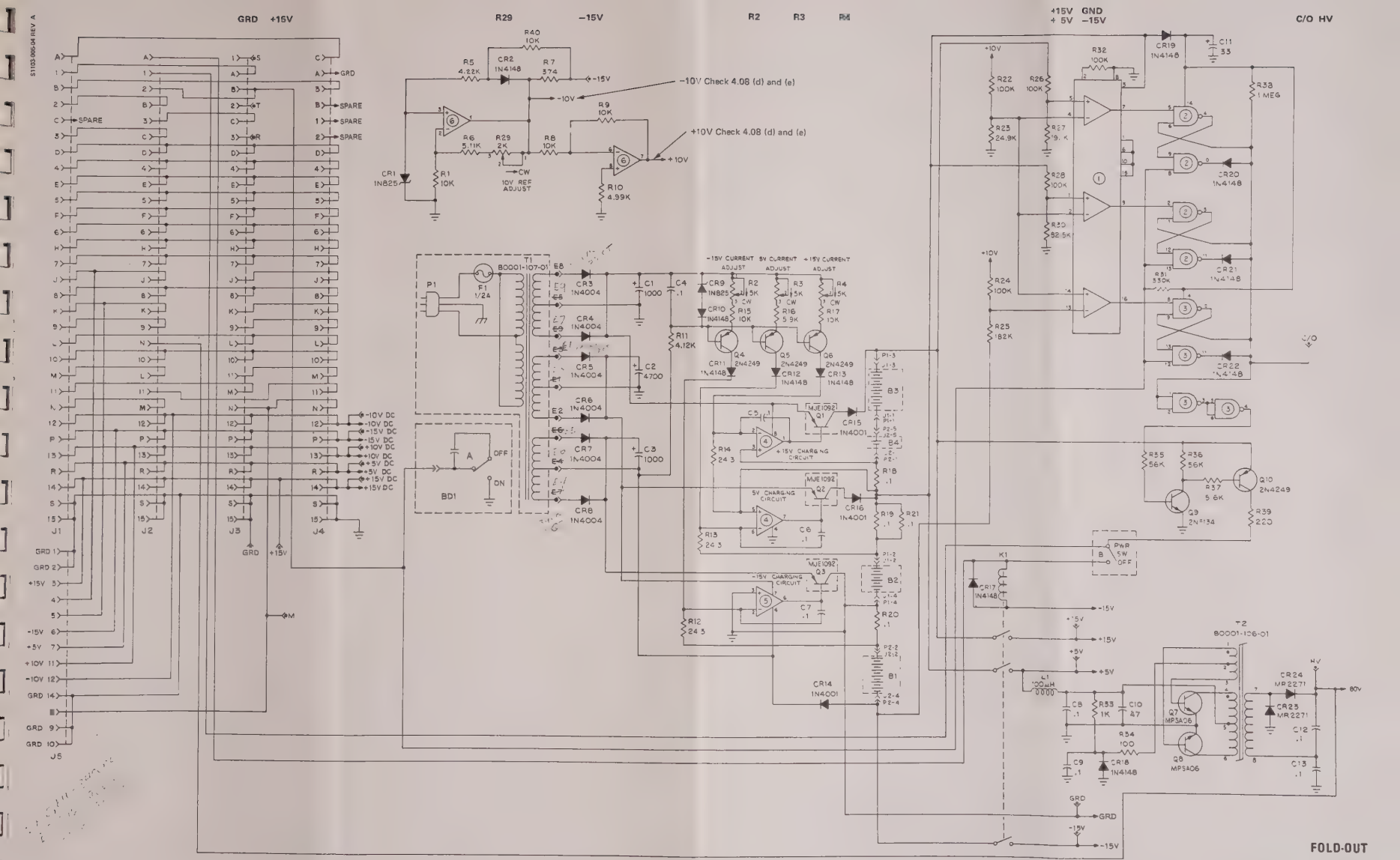
A.C. Power Supply Board

FOLD-OUT **1b**



COMPONENT LAYOUT

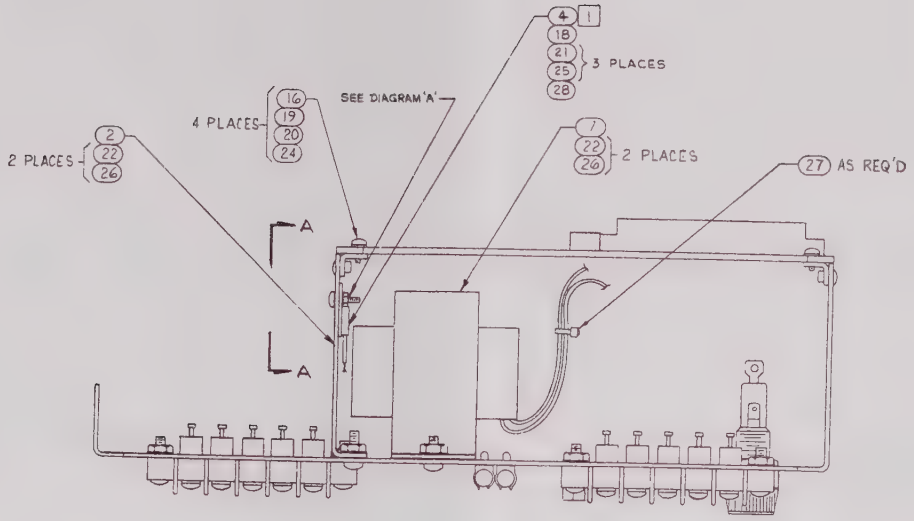
ic

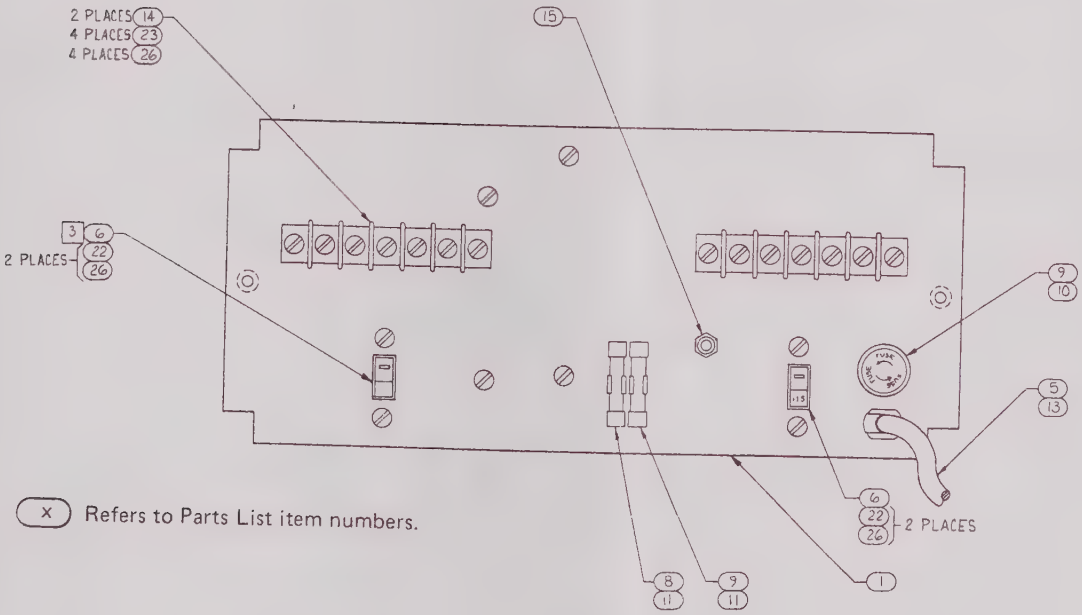


SCHEMATIC

FOLD-OUT

D.C. Power Supply Board **1c**





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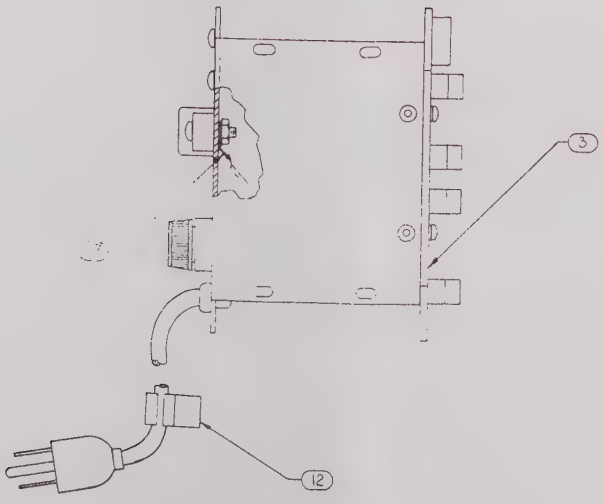

Assembly
A.C. Power Supply Board

2a

P1103-034 SEE TAB REV. E

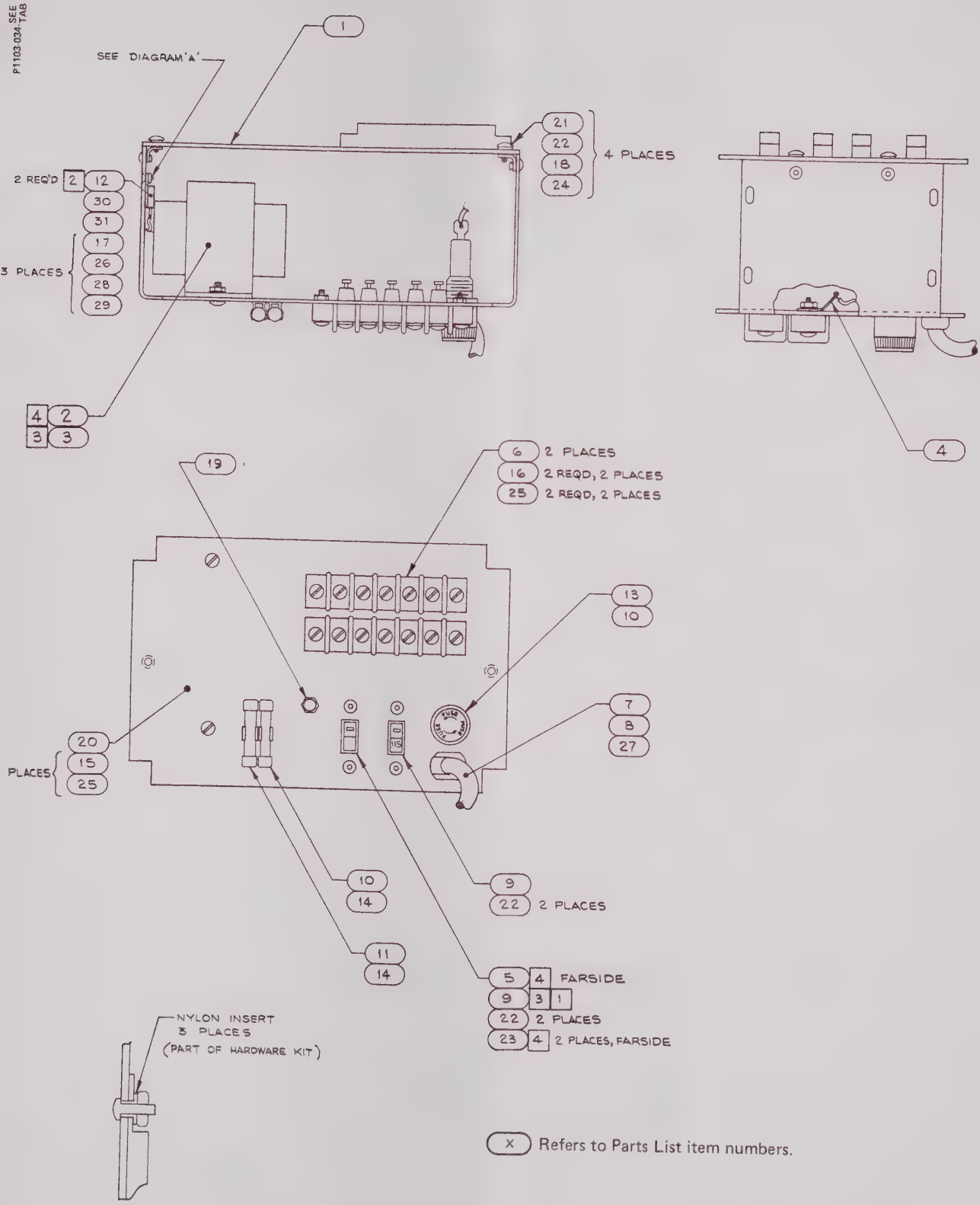

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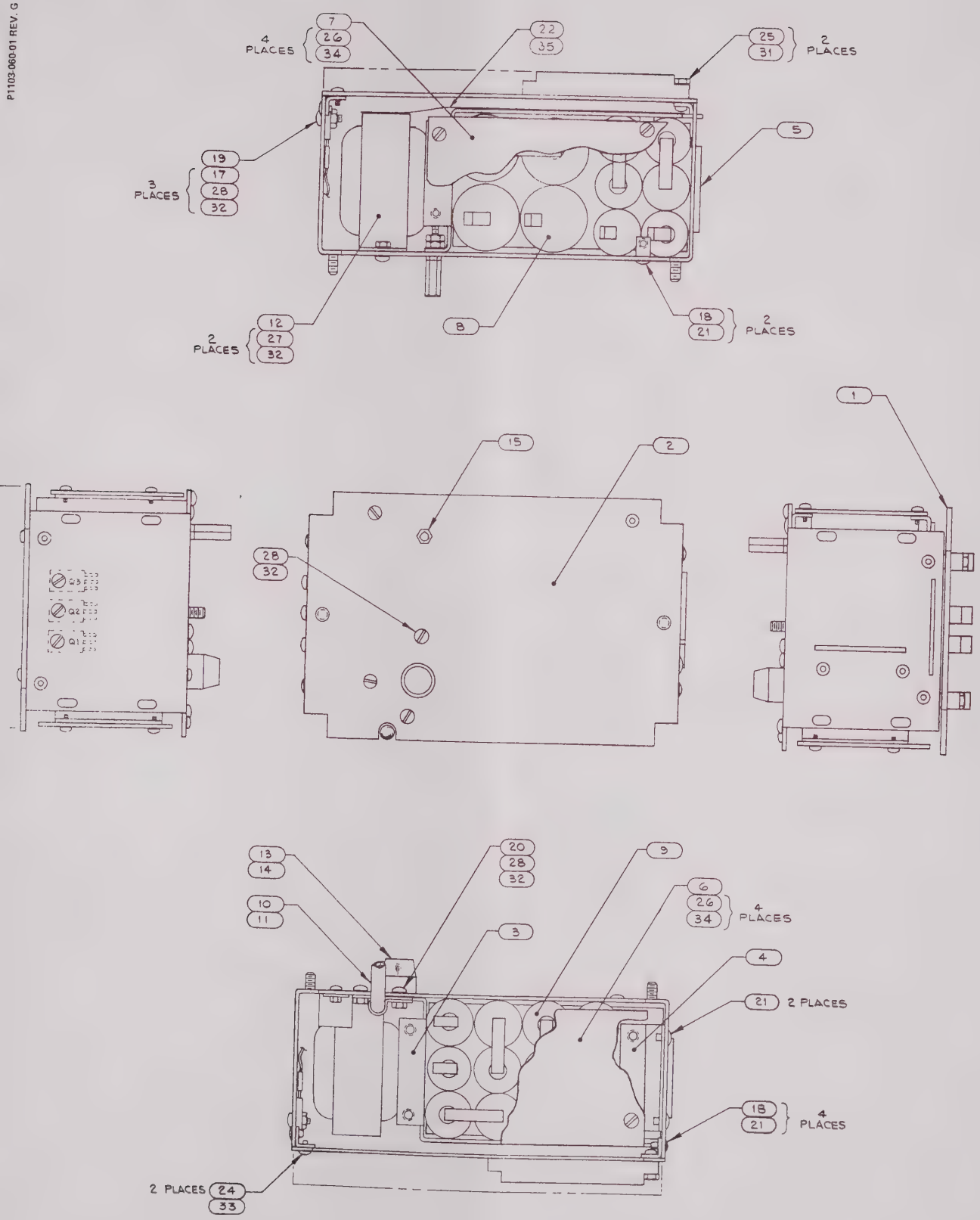
DIAGRAM A



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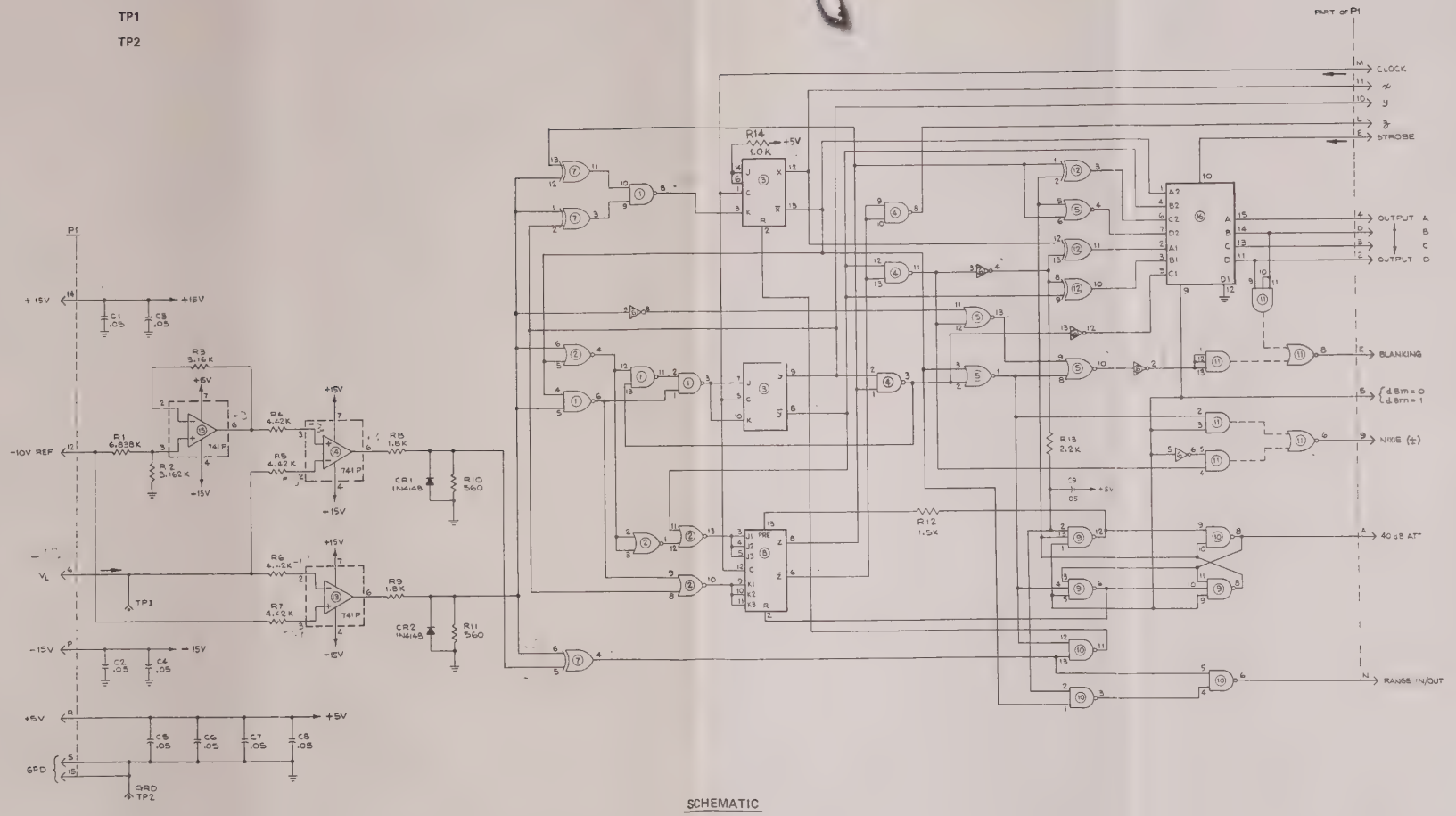
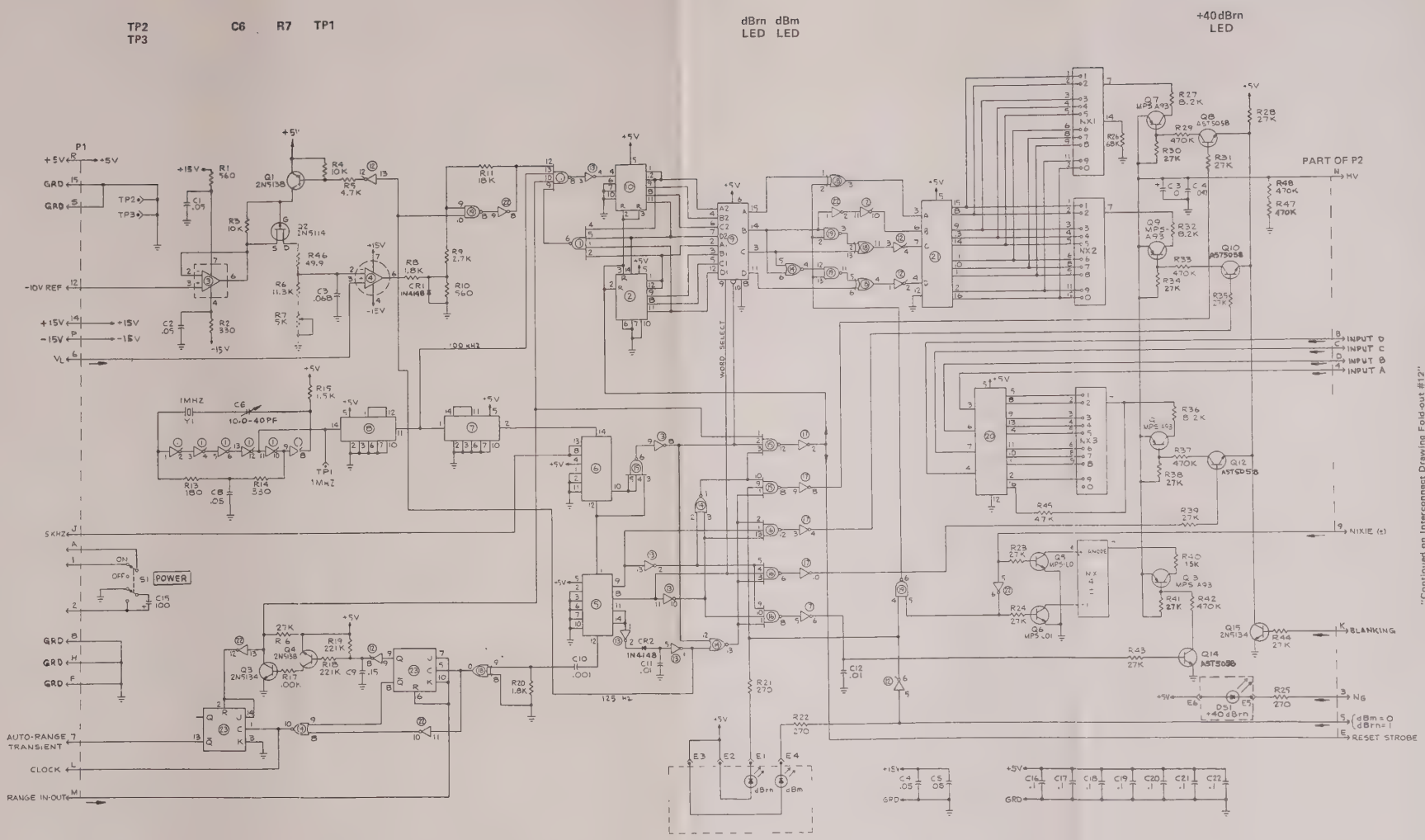


SCHEMATIC

"Continued on Interconnect Drawing Fold-out #12"

"Continued on Interconnect Drawing Fold-out #12"



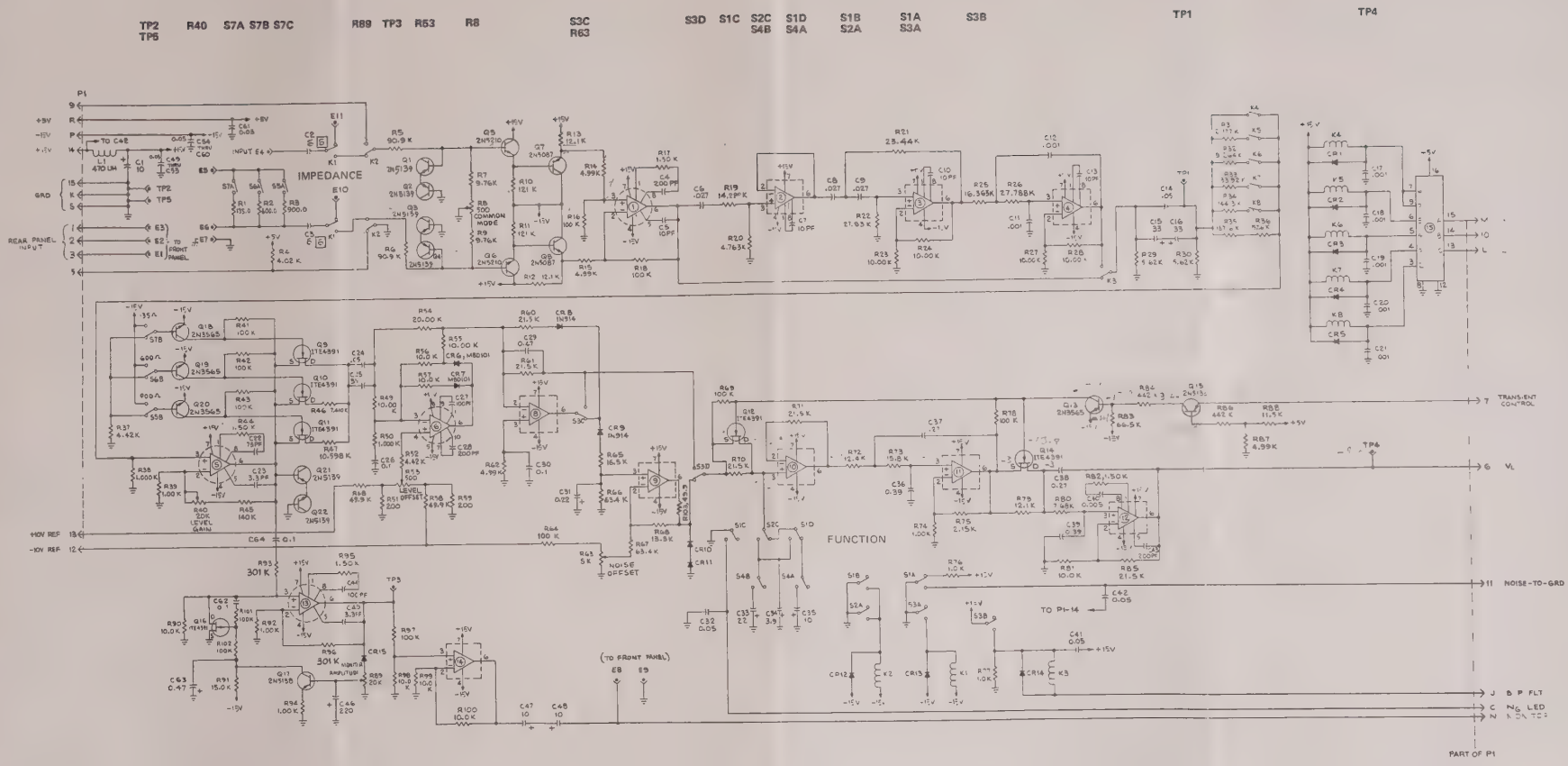
"Continued on Interconnect Drawing Fold-out #12"

"Continued on Interconnect Drawing Fold-out #12"

SCHEMATIC

FOLD-OUT

"Continued on Interconnect Drawing Fold-out #12"



SCHEMATIC

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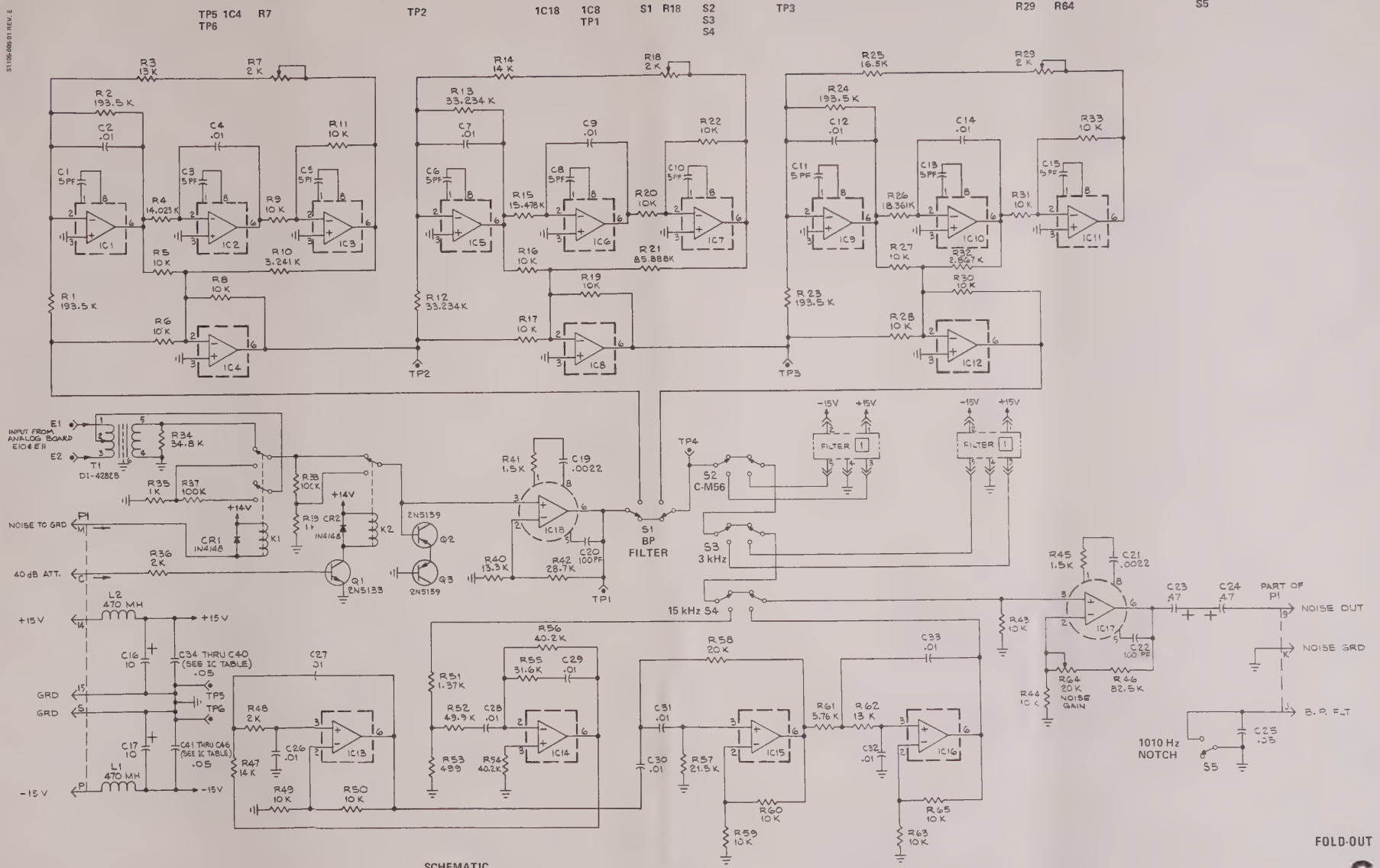

SCHEMATIC

S1105-606-01 REV. E

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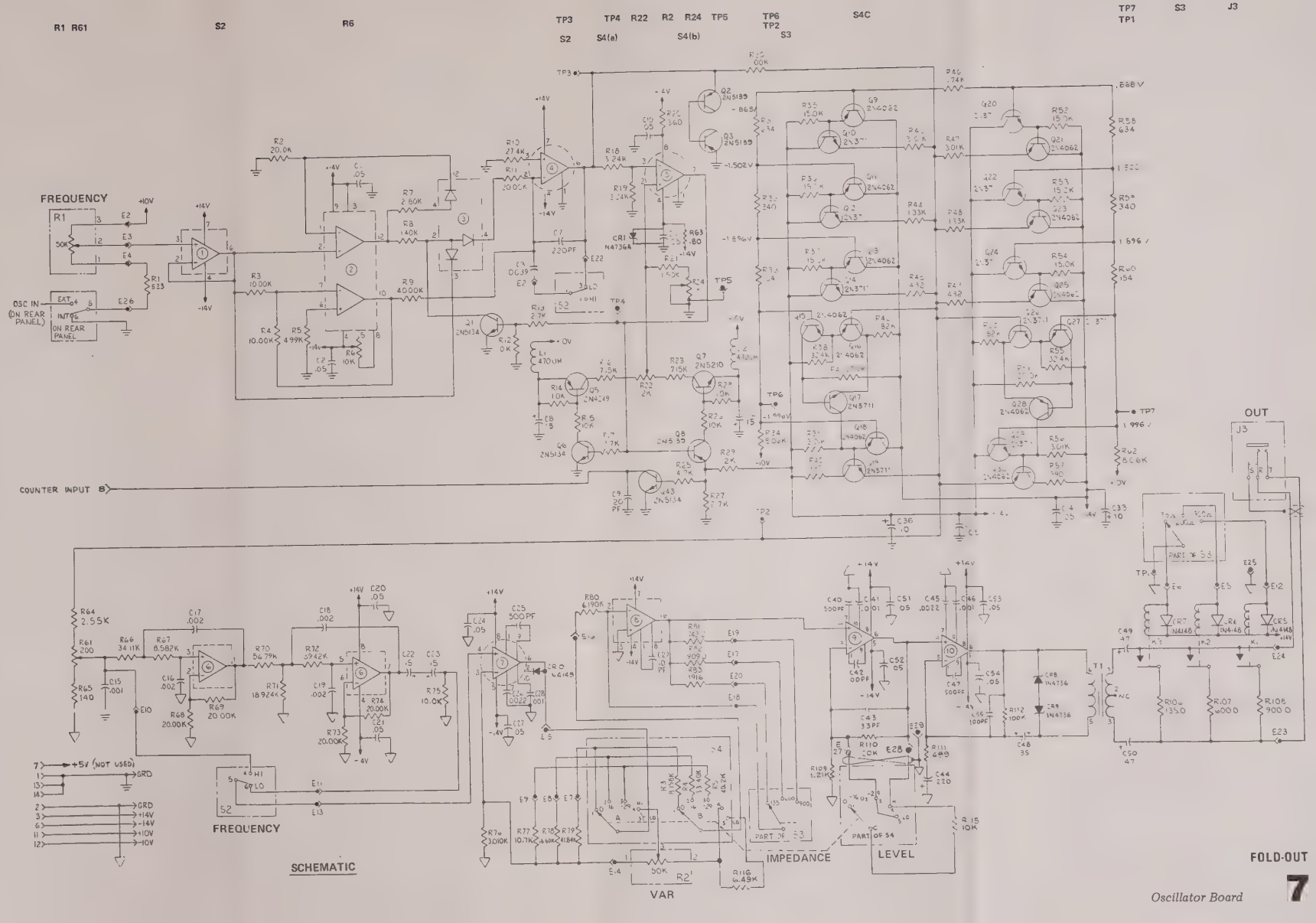

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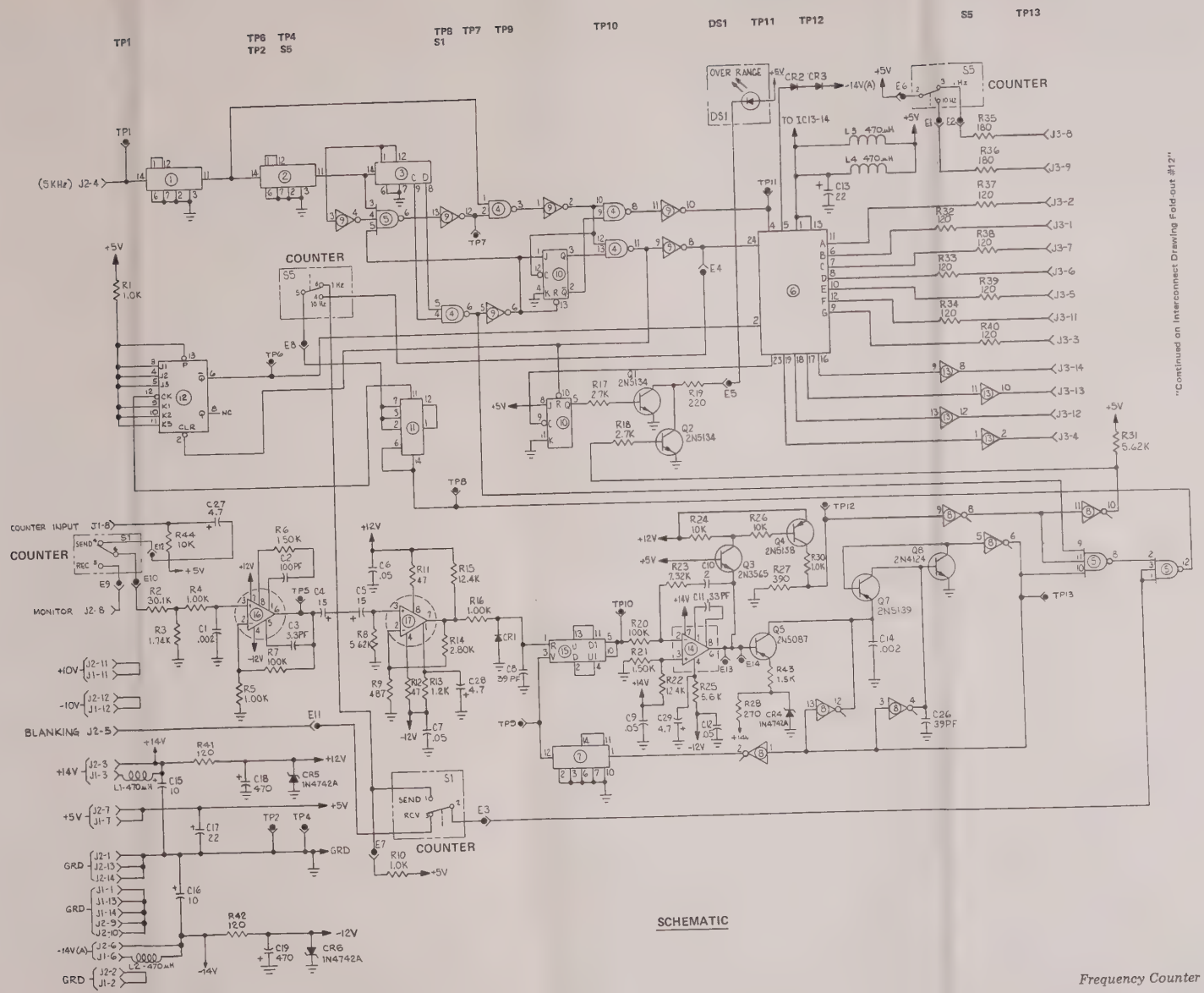
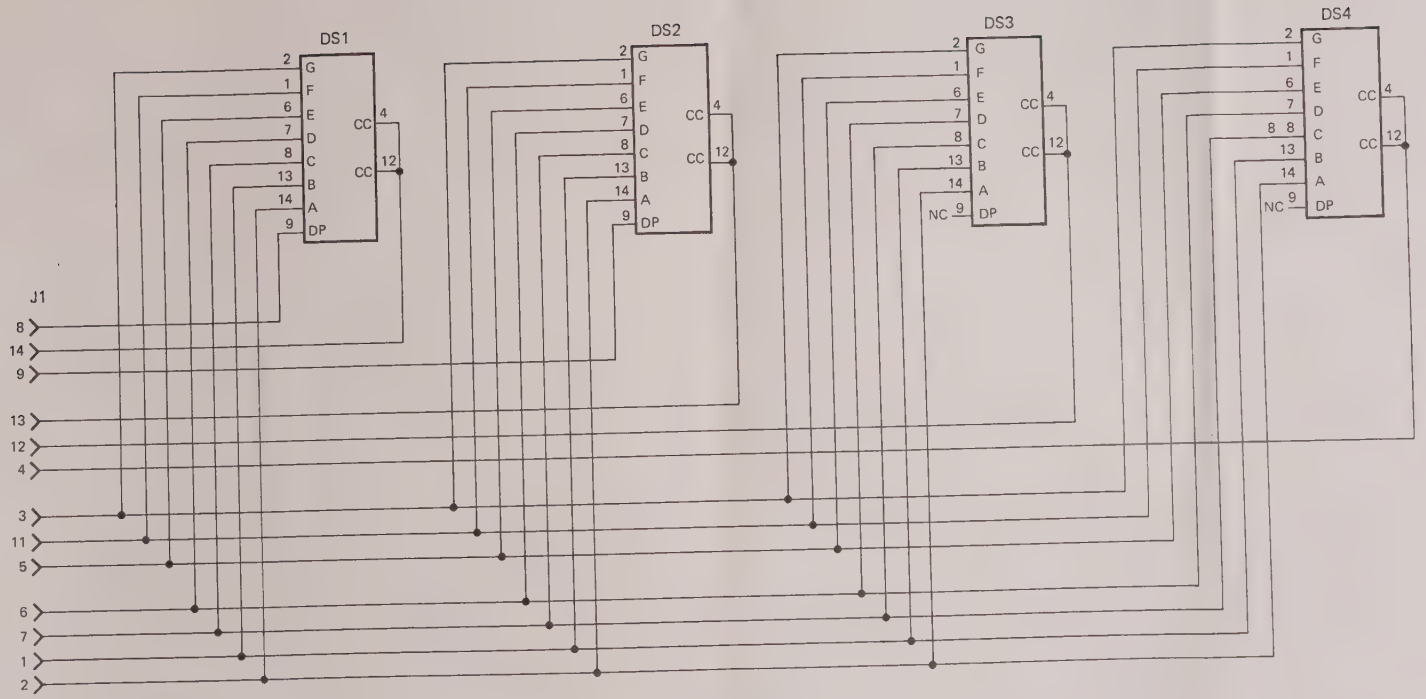

TP1
TP6 TP4
TP2 S5
TP8 TP7 TP9
S1
TP10
DS1 TP11 TP12
S5 TP13
OVER RANGE
DS1
CR2 CR3
-14V(A)
COUNTER
TO IC13-14
L3 470mH
L4 470mH
C13 22
R35 180
R36 180
R37 120
R32 120
R38 120
R33 120
R39 120
R34 120
R40 120
J3-8
J3-9
J3-2
J3-1
J3-7
J3-6
J3-5
J3-11
J3-3
J3-14
J3-13
J3-12
J3-4
(5KHz) J2-4
R1 1.0K
COUNTER
E8
TP6
E4
E5
R17 2.7K
R19 220
R18 2.7K
Q2 2N5134
R31 5.62K
TP8
"Continued on Interconnect Drawing Fold-out #12"
COUNTER INPUT J1-8
C27 4.7
R44 10K
COUNTER
MONITOR J2-8
R2 30.1K
R4 1.00K
R3 1.74K
C1 .002
C3 3.3PF
R7 100K
R5 1.00K
R6 150K
C2 100PF
TP5 C4 15
+10V J2-11 J1-11
-10V J2-12 J1-12
BLANKING J2-5
C5 15
C6 .05
R11 47
R15 12.4K
R16 1.00K
R8 5.62K
R9 487
R12 47
R13 1.2K
R14 2.80K
C28 4.7
C7 .05
CR1
C8 39 PF
TP3
R24 10K
R26 10K
Q4 2N5138
R23 7.32K
C10 2
Q3 2N3565
R27 390
R30 1.0K
C11 33PF
TP10
R20 100K
R21 1.50K
R22 12.4K
R25 5.6K
JE13
E14
Q5 2N5087
R43 1.5K
R28 270
CR4 1N4742A
C9 .05
C29 4.7
C12 .05
TP12
Q8 2N4124
Q7 2N5139
C14 .002
C26 39PF
TP13
+14V J2-3 J1-3
L1-470mH
C15 10
R41 120
C18 470
CR5 1N4742A
+5V J2-7 J1-7
C17 22
TP2 TP4
GRD J2-1 J2-13 J2-14
GRD J1-1 J1-13 J1-14 J2-9 J2-10
C16 10
R42 120
C19 470
CR6 1N4742A
-14V(A) J2-6 J1-6
L2-470mH
GRD J2-2 J1-2
S1
SEND
RCV
E3
E7
R10 1.0K
COUNTER
"Continued on Interconnect Drawing Fold-out #12"

SCHEMATIC



SCHEMATIC

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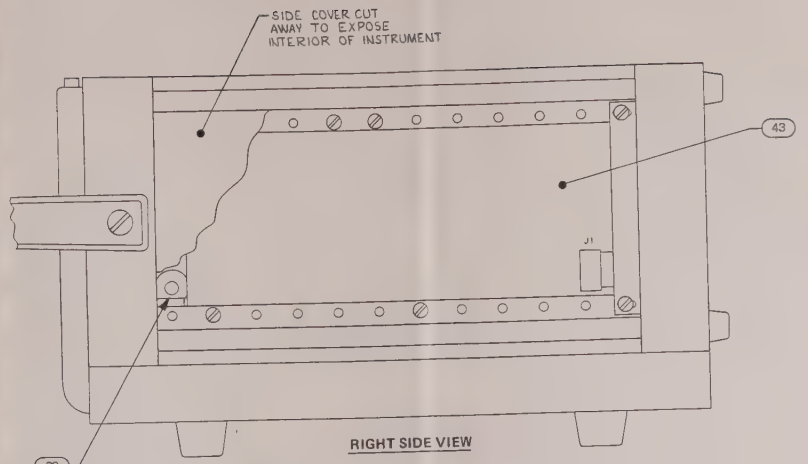
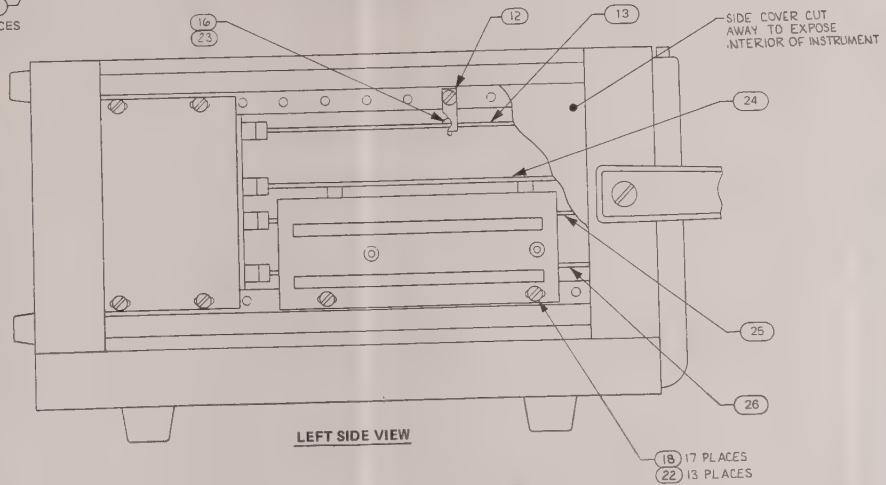
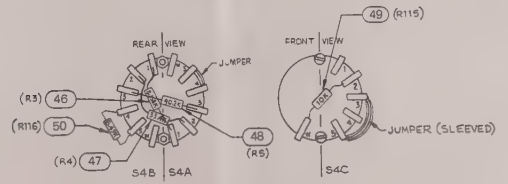


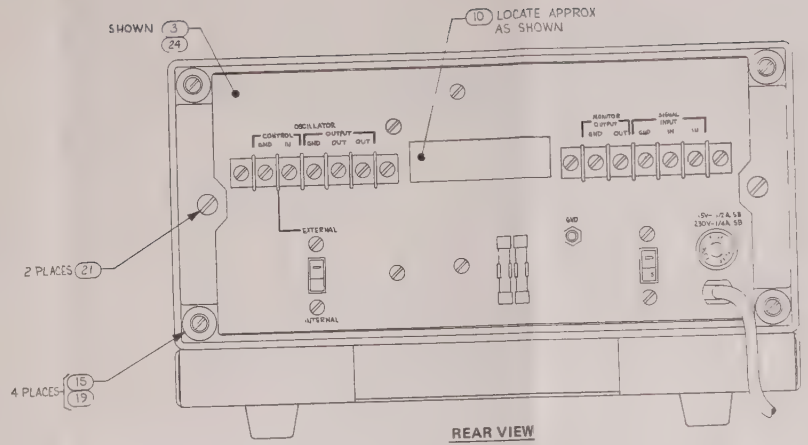
RIGHT SIDE VIEW



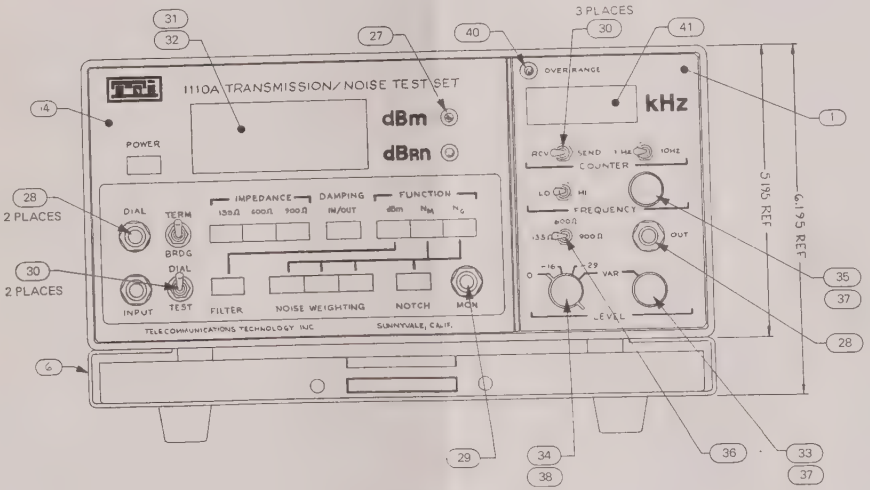
LEFT SIDE VIEW



P1110-002-01 REV. E

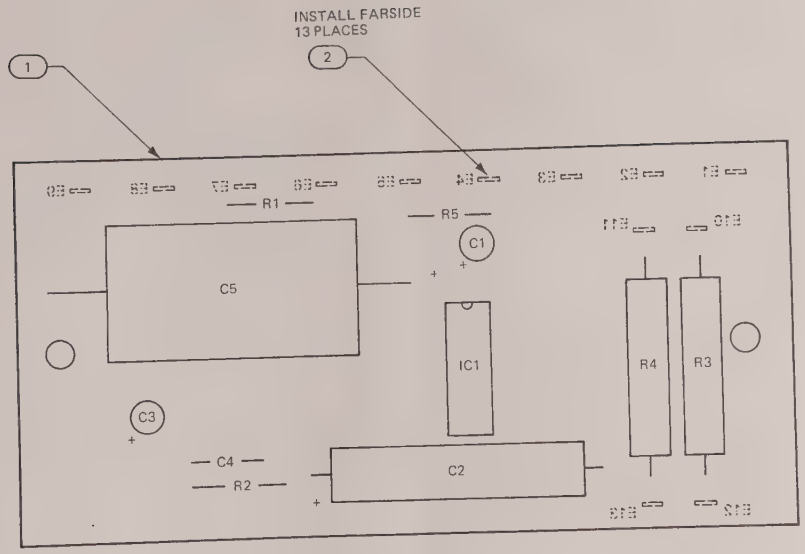


REAR VIEW



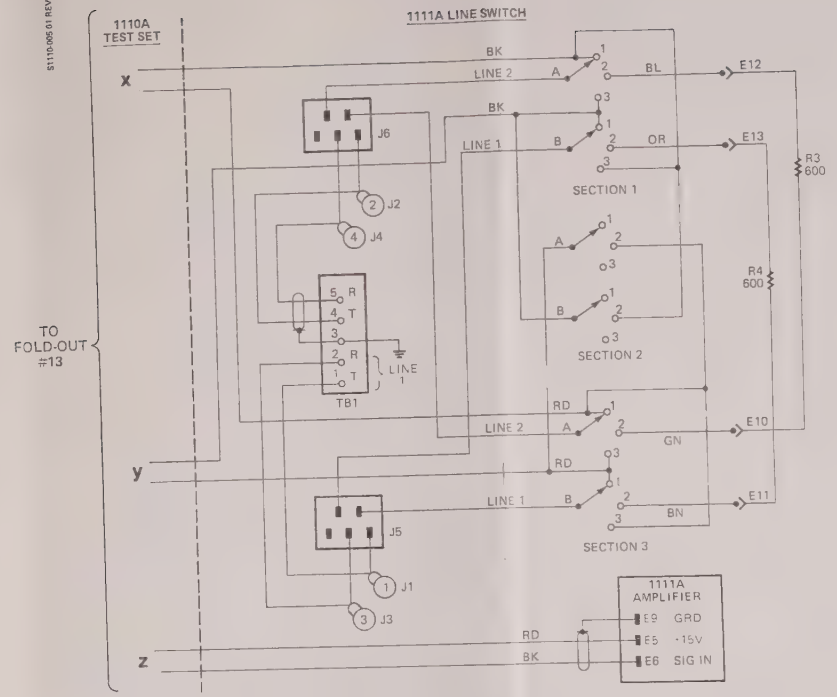
FRONT VIEW

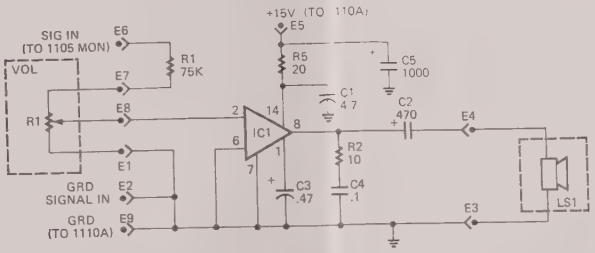
P1110-040-01 REV. AC



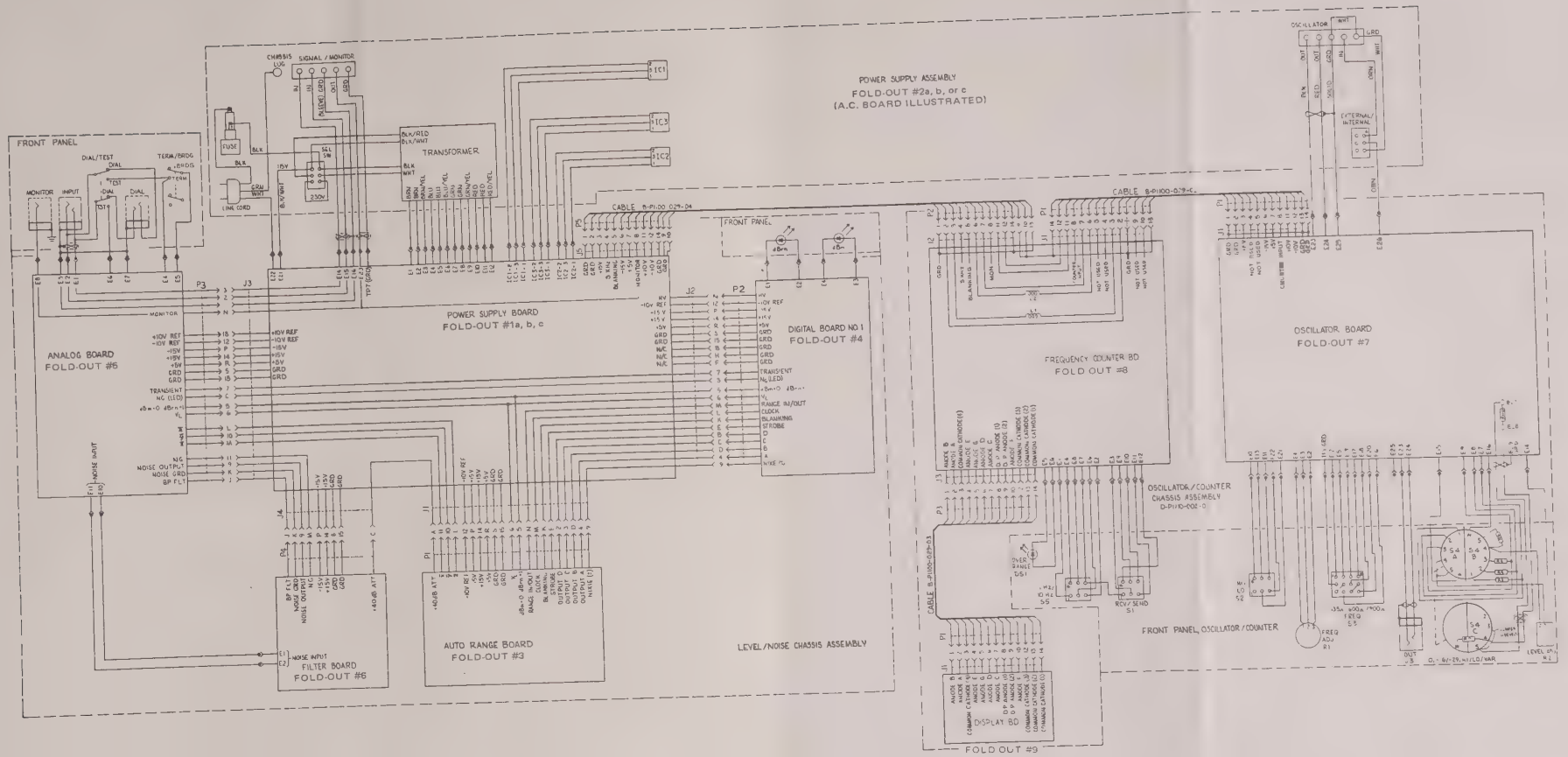
COMPONENT LAYOUT

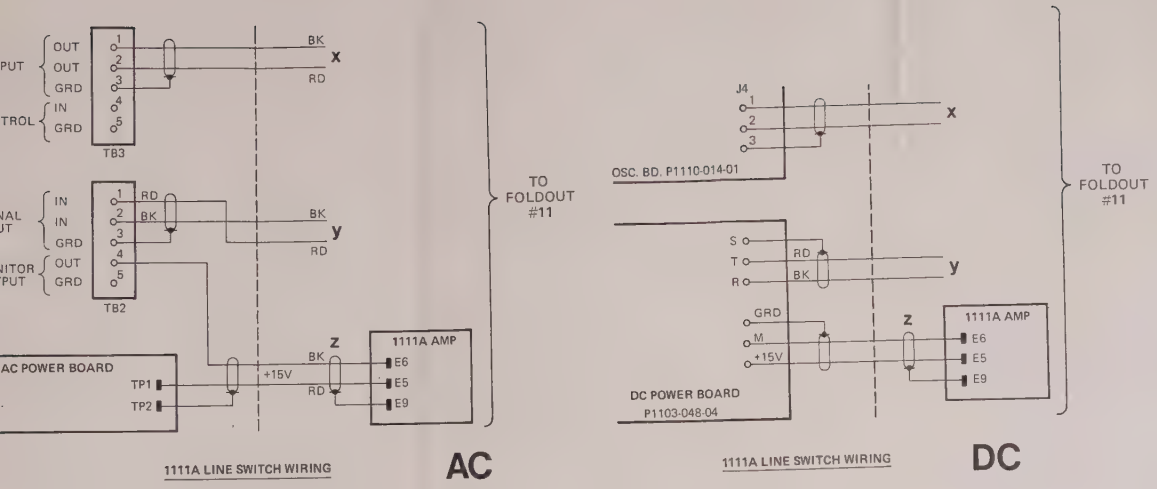
S1110-005-01 REV. AC





SCHEMATIC


POWER SUPPLY ASSEMBLY
FOLD-OUT #2a, b, or c
(A.C. BOARD ILLUSTRATED)
FRONT PANEL
TRANSFORMER
CABLE B-P1D0 029-04
POWER SUPPLY BOARD
FOLD-OUT #1a, b, c
ANALOG BOARD
FOLD-OUT #6
DIGITAL BOARD NO 1
FOLD-OUT #4
AUTO RANGE BOARD
FOLD-OUT #3
NOISE INPUT
FILTER BOARD
FOLD-OUT #6
LEVEL/NOISE CHASSIS ASSEMBLY
CABLE B-P1K0-029-03
FREQUENCY COUNTER BD
FOLD OUT #8
OSCILLATOR BOARD
FOLD-OUT #7
OSCILLATOR/COUNTER
CHASSIS ASSEMBLY
B-P1K0-002-0
FRONT PANEL, OSCILLATOR/COUNTER
DISPLAY BD
FOLD OUT #9



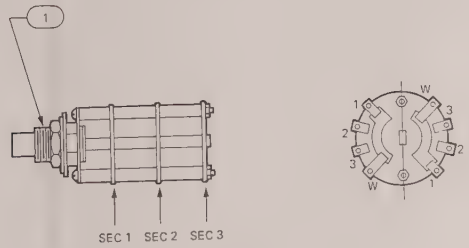
1111A LINE SWITCH WIRING

AC

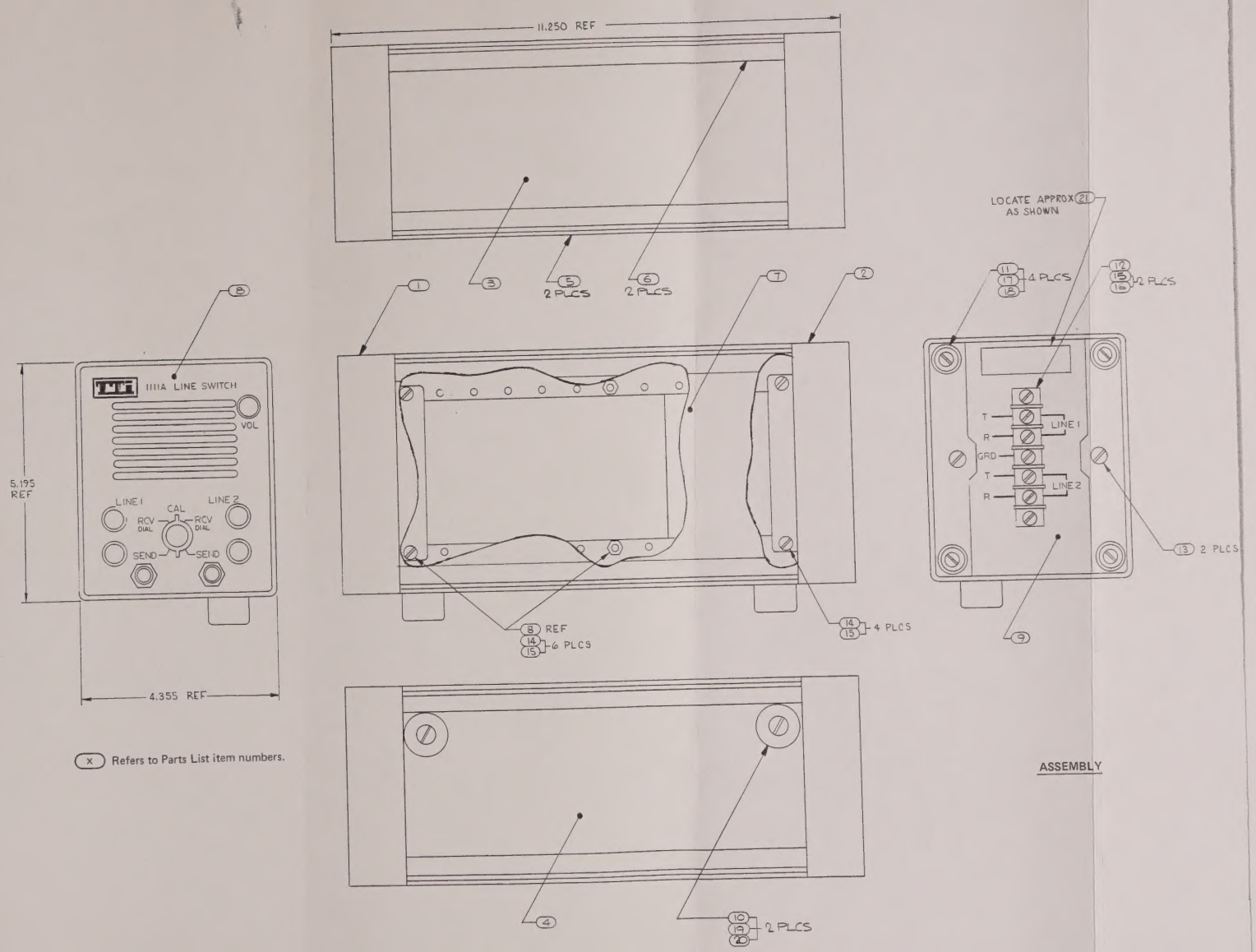
1111A LINE SWITCH WIRING

DC

SCHEMATIC



ROTARY SWITCH



(x) Refers to Parts List item numbers.

ASSEMBLY